

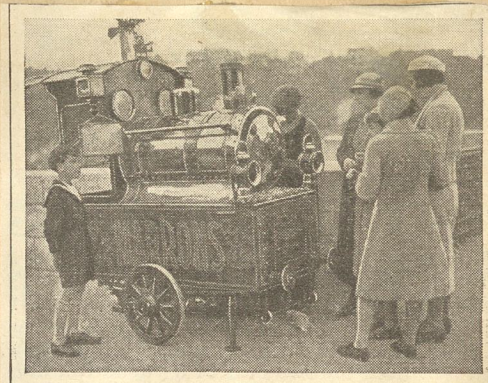
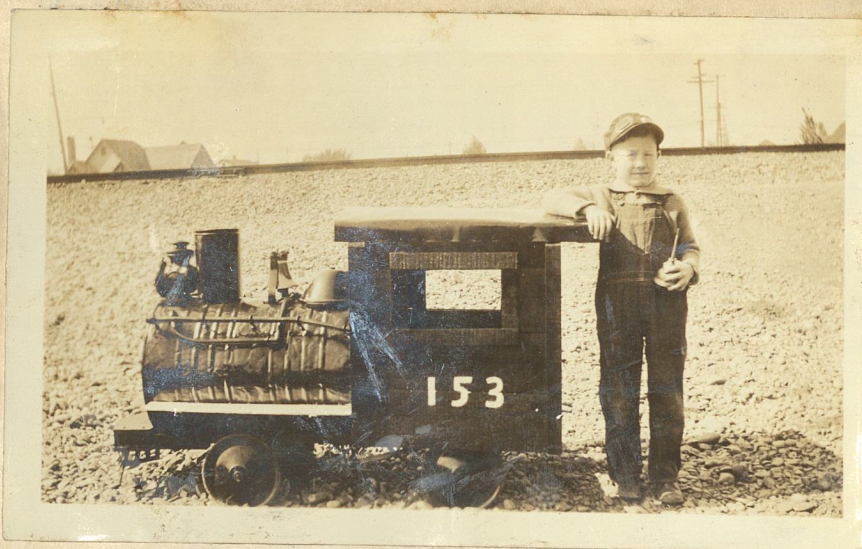


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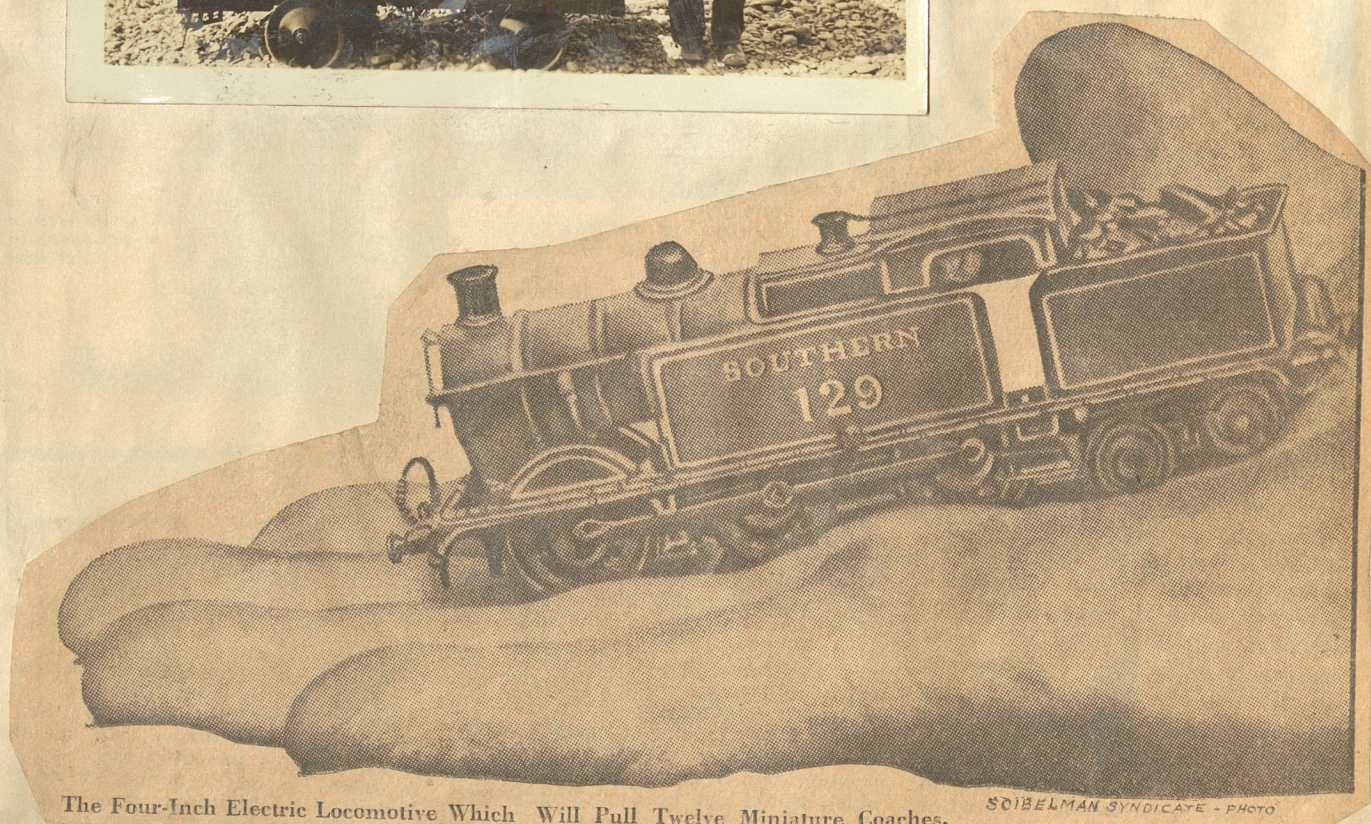
中國鐵路

387-1674

Robert Loraln
Tiger Patrol



An enterprising French popcorn vendor built this model locomotive on his popcorn cart to attract attention to his wares. Steam is used to blow the peanut whistle.

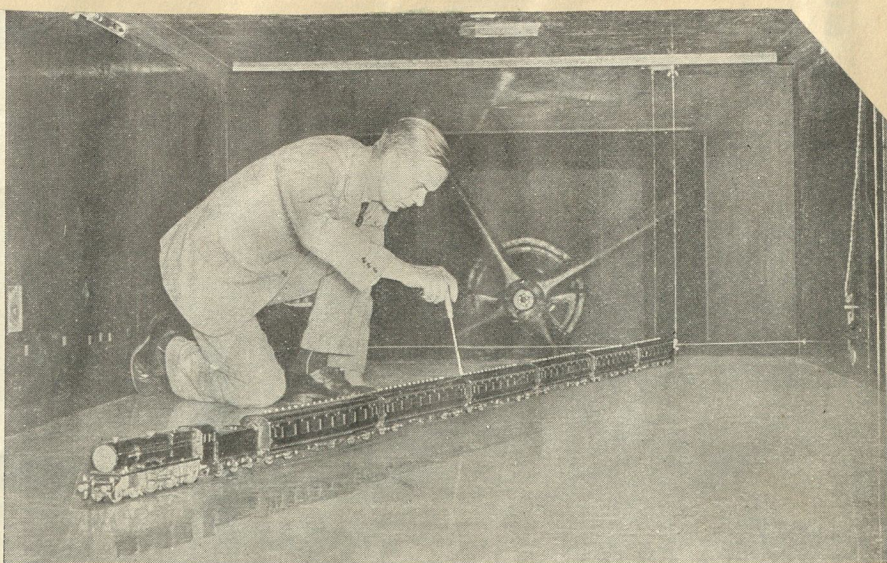


The Four-Inch Electric Locomotive Which Will Pull Twelve Miniature Coaches.

SOBELMAN SYNDICATE - PHOTO

RAILROAD USES TOYS TO FIND LOSS DUE TO WIND

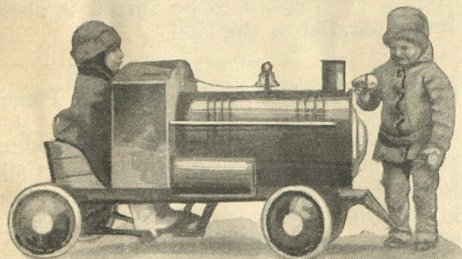
TOY-SIZED trains were recently taken to a wind tunnel at Teddington, England, to help experimenters learn how to reduce the wind resistance and power consumption of engines and cars. Strung upon a steel bar connected to balances outside the tunnel, a model six-coach train was thus exposed at an angle to the roaring gale of an airplane propeller while the engineers measured the forces striking it from front and side. Models of individual locomotives were also hung on wires attached to balances, for tests at wind speeds as high as seventy miles an hour. The picture at right shows an experimenter setting up the model of the train in front of the powerful blast from the whirling airplane propeller. The force of the air current is carefully gaged to ensure accuracy of the data.





Child's Toy Locomotive Made from Oil Drum

Using the chassis of a child's toy automobile, a miniature locomotive can be built from an oil drum, which serves the purpose of a boiler, and a length of stovepipe, which is used as a stack. Additional features are a cab, which is made of tin, and a cowcatcher. The engineer has a seat in the rear and supplies the power with his feet. Painted suitably, this makes a very attractive outfit.



Child's Locomotive Made from Oil Drum Mounted on Toy Auto Chassis

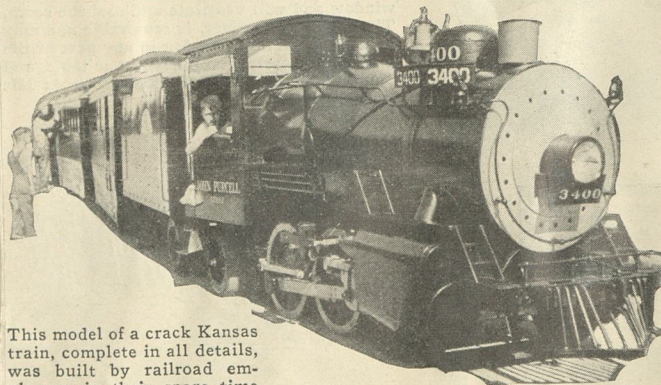
For all diameters the transverse pressure on a boiler is double the longitudinal pressure.

RAILROAD WORKERS BUILD MODEL OF CRACK TRAIN

WORKING during their spare time, employees of the Santa Fe railroad at Topeka, Kan., have built a remarkable model of one of the line's crack trains. The locomotive is about five feet tall and

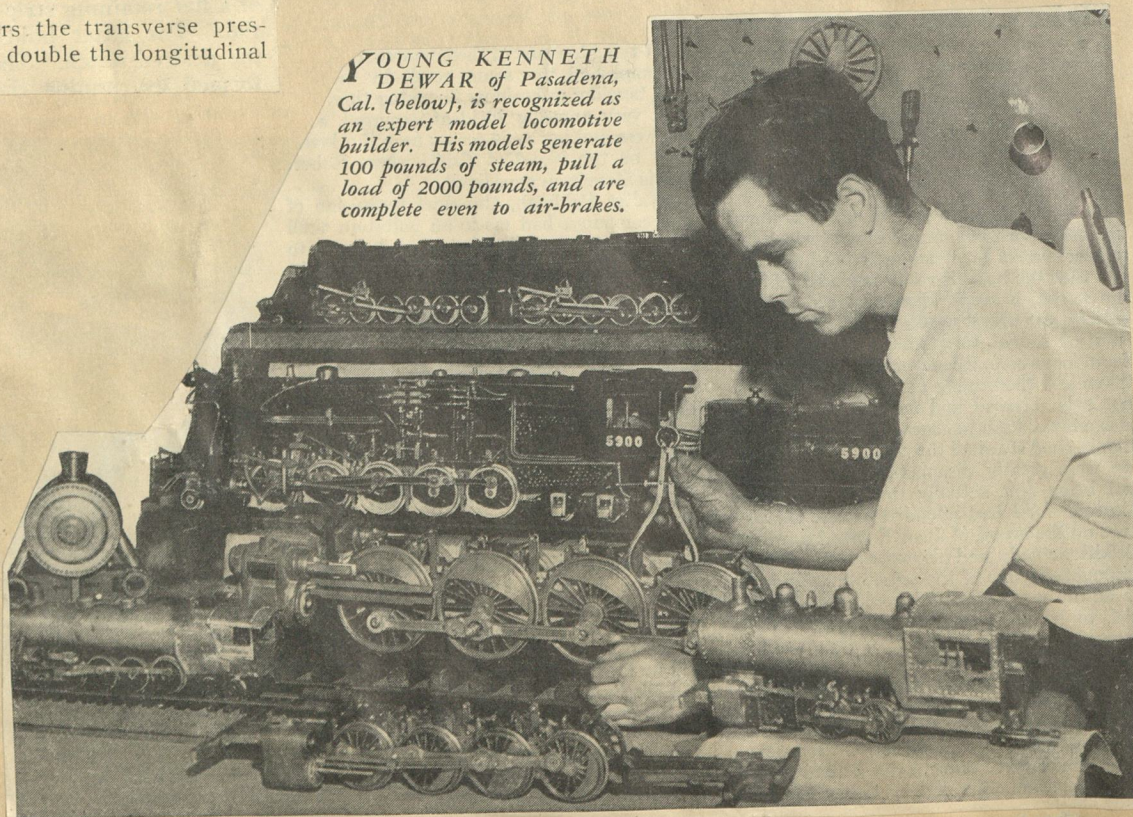
runs under the power of an old four-cylinder automobile motor. Actual smoke from burning oil comes from the smoke-stack to give the illusion of reality. Each coach is made of steel and electrically lighted.

The "train" runs upon rubber-tired wheels. In the dining car are tables with linen laid and each chair occupied by a doll diner. There is an observation car with brass railing at the rear and folding chairs on the platform. All seats are upholstered in plush, and leather covers drawing room chairs.



This model of a crack Kansas train, complete in all details, was built by railroad employees in their spare time

YOUNG KENNETH DEWAR of Pasadena, Cal. (below), is recognized as an expert model locomotive builder. His models generate 100 pounds of steam, pull a load of 2000 pounds, and are complete even to air-brakes.



I WRECKED 146 LOCOMOTIVES

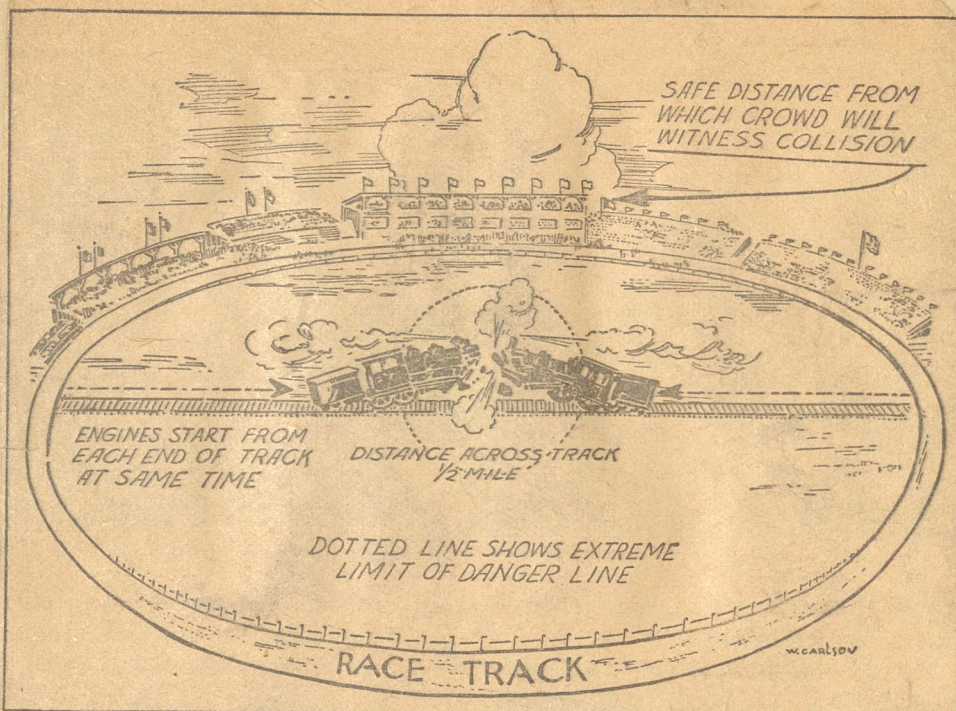


Diagram Showing Method Used for Spectacles at Brighton Beach Race Track in 1906, 1907 and 1911

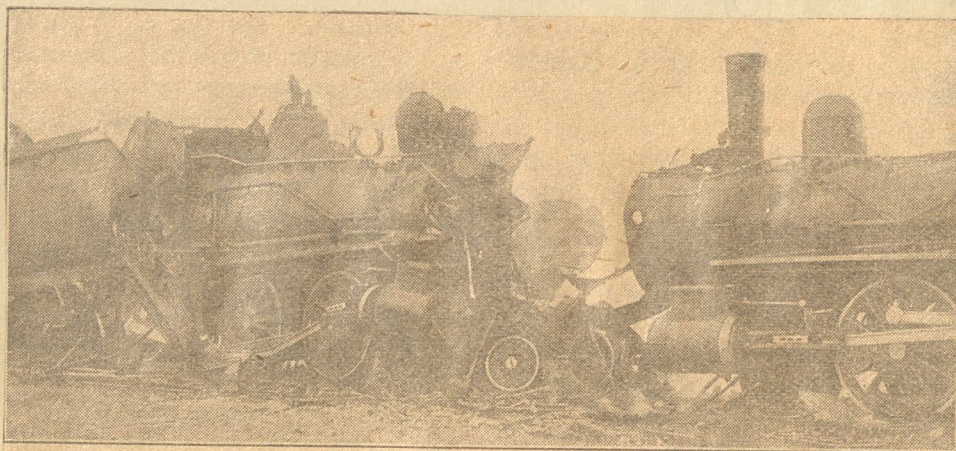
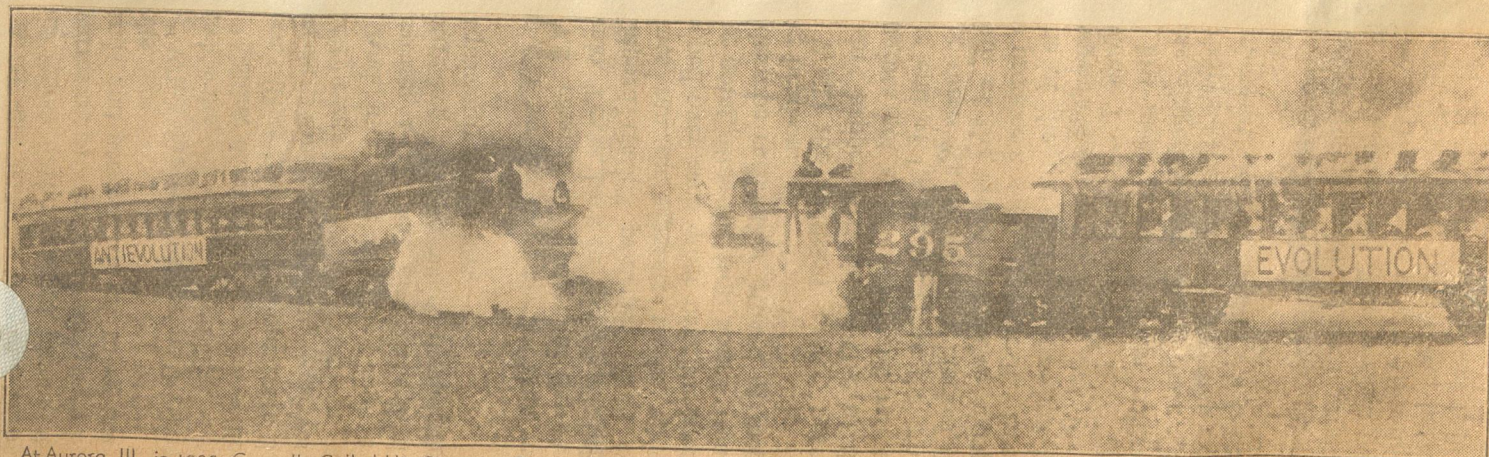


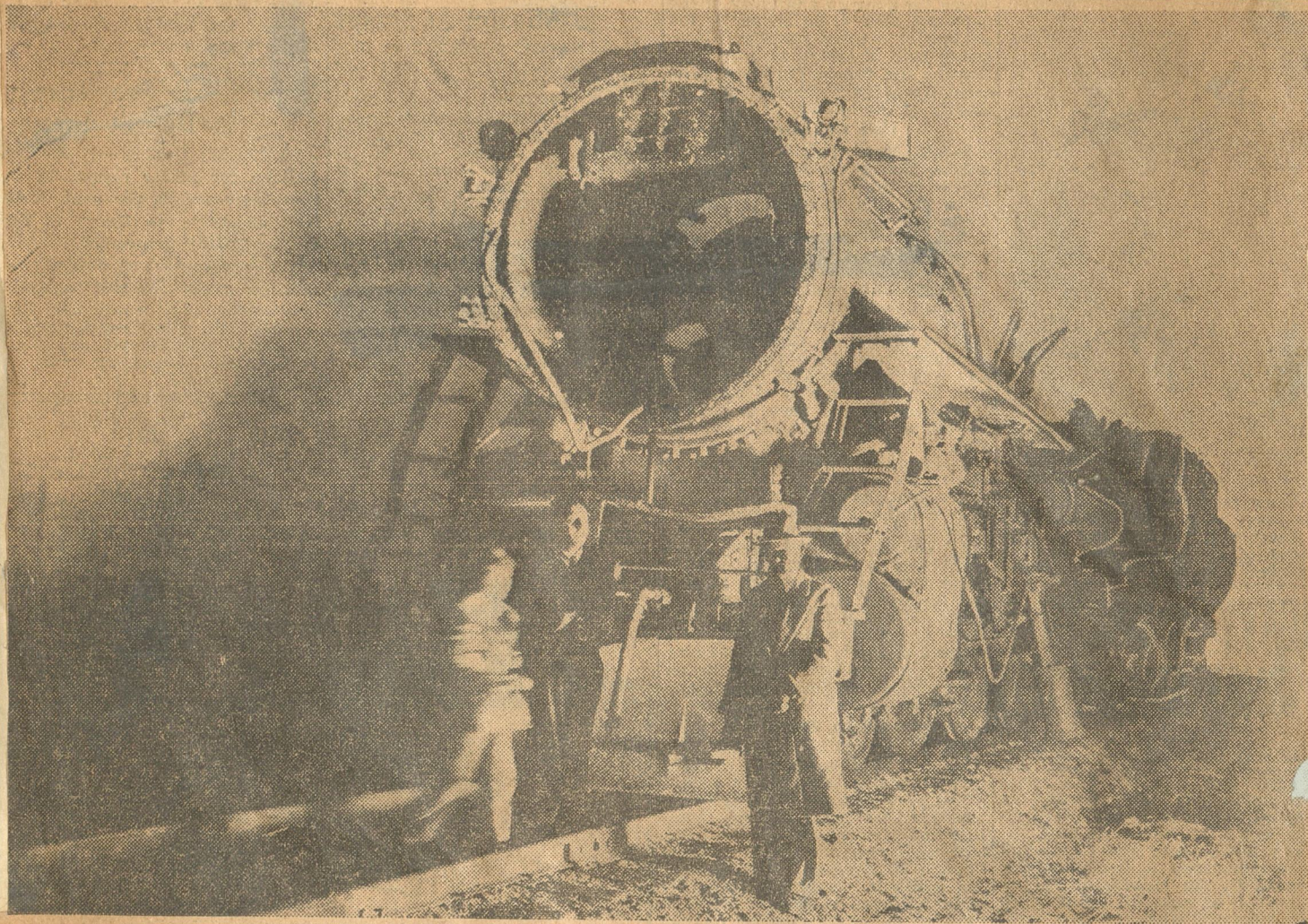
Photo by L. L. Reese, 1022 Lyon St., Des Moines, Iowa

What Was Left of Joseph S. Connolly's Engines at the Iowa State Fair Last Summer



At Aurora, Ill., in 1925, Connolly Called His Opposing Trains "Evolution" and "Anti-Evolution," to Capitalize on Public Interest in the Scopes Trial in Tennessee

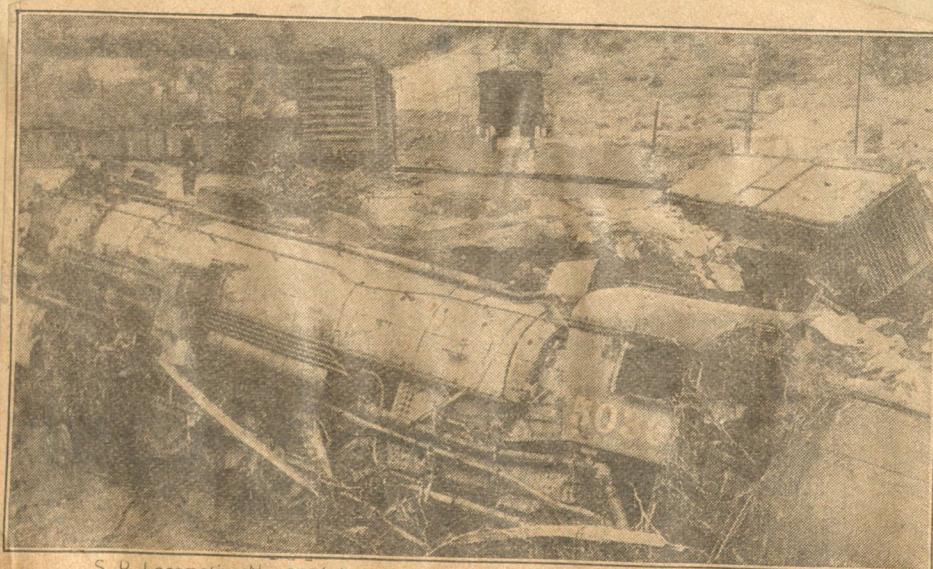
Remains Of Locomotive Boiler After Fatal Blast



THE effect of the terrific blast when the boiler of a Southern Pacific Company passenger locomotive exploded yesterday near Rich-
 ie, Butte County, killing the engineer and fireman, is shown in the
 ve picture. The view was taken from the front or pilot of the
 2.
 The iron front of the locomotive was torn out as though a gargan-

tean can opener had been used. The yawning hole to the right shows
 where the cab and boiler were torn and hurled free of the locomotive.
 The crushed tender can be seen in the rear. This picture was taken
 at night. The engine, No. 4402, was of the Golden State type, one of the
 finest in the Southern Pacific Company passenger service.

LOST, ONE ENGINE



S. P. Locomotive No. 5036 Was Turned Completely Around and Shoved into a Gully

First Views Of Keddie Train Wreck

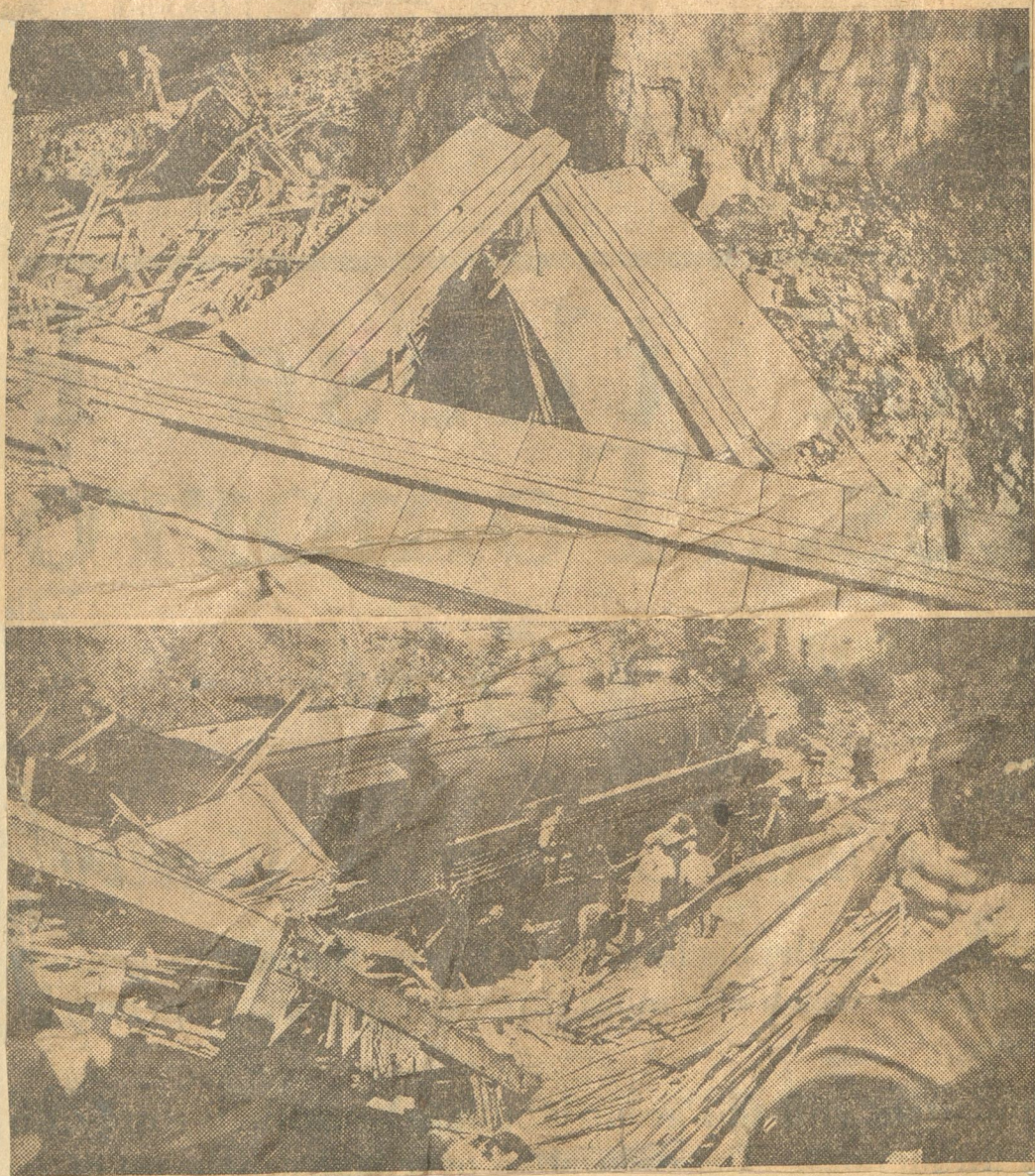
PICTURED herewith are scenes of the wreck at Tunnel 33, on the Western Pacific near Keddie last Friday, in which the only casualties were about 250 hogs. The wreck occurred when the locomotive of the freight train, westbound, struck a landslide. The engine was derailed and turned partly on its side, while four cars containing hogs were telescoped by the impact of the twenty other loaded cars of the train.

Three of the train crew were trapped in the cab of the wrecked engine until released by

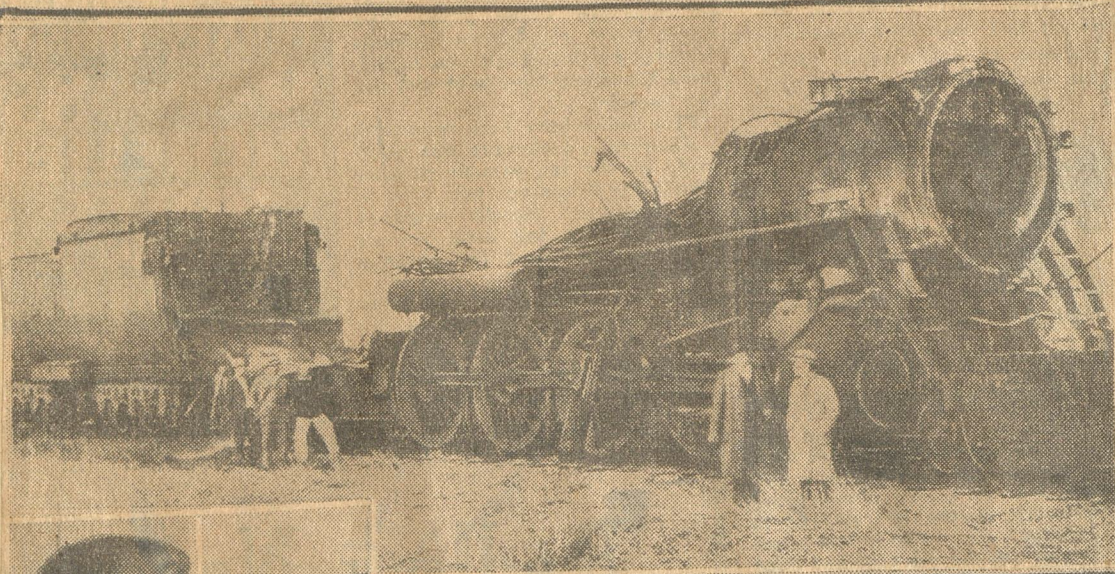
one of the two wrecking crews dispatched to the scene. The men were uninjured.

The views show: Top, three of the freight cars which were piled up, but not crushed. Bottom, general view of the wreck, showing the cars smashed into splinters between the locomotive and the remainder of the heavy train.

The pictures were taken by Mrs. Owen Morris, Quincy correspondent of The Bee, who reached the scene of the wreck soon after the crash, and was not only the only woman on the scene, but the only newspaper correspondent to visit there.



Shattered by Mysterious Explosion

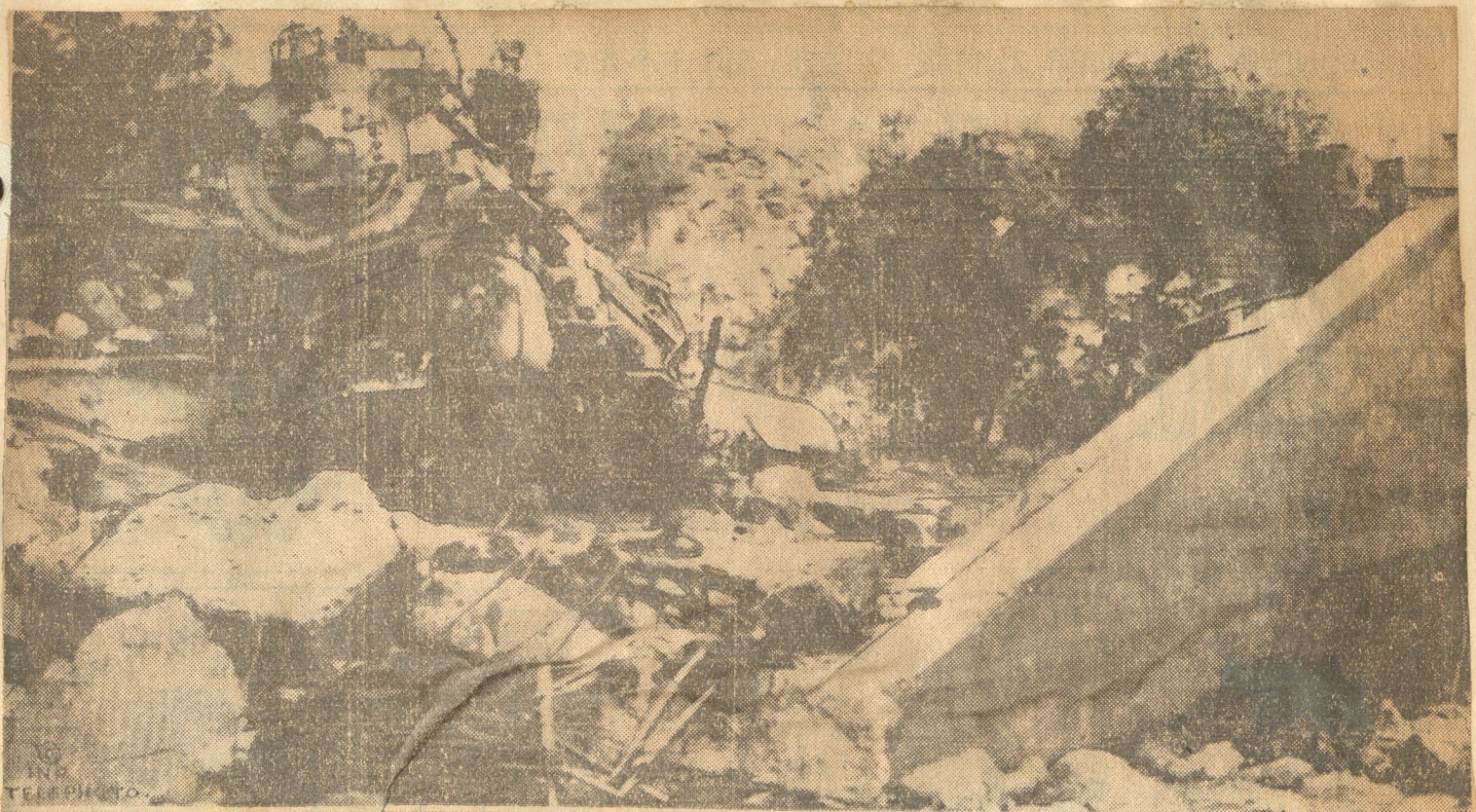


ALL THAT WAS LEFT of the Southern Pacific West Coast Limited's locomotive following mysterious explosion Christmas Day which killed two men.

Death At The Throttle



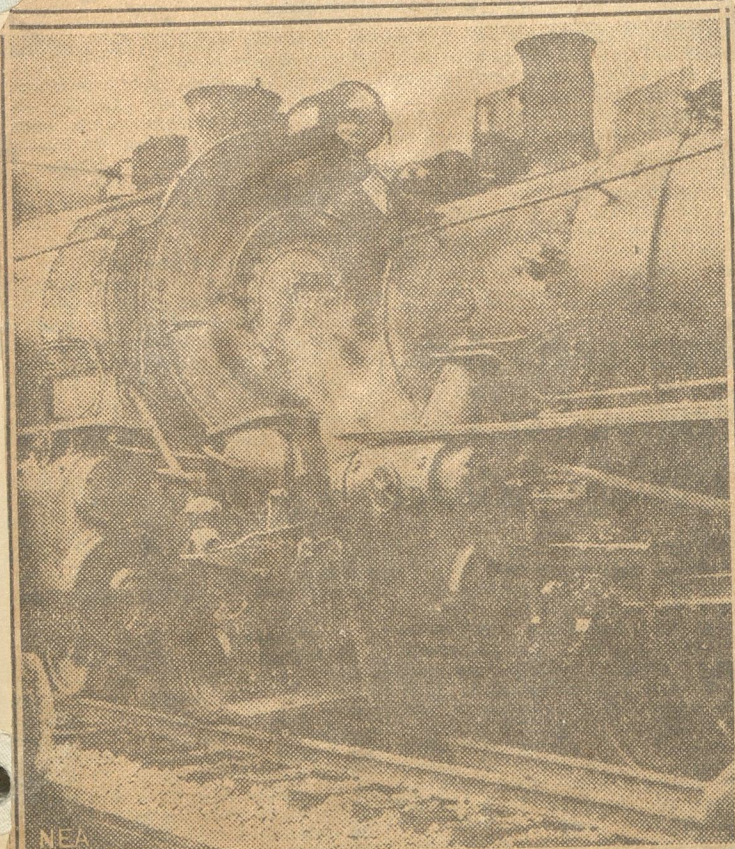
Here is a view of the wreckage after a Seaboard Airline passenger train struck a freight near Fredericksburg, Va. The engineer and firemen of the passenger train were killed. —Associated Press Photo.



WRECKAGE OF Southern Pacific freight train, which crashed when bridge weakened by Tehachapi cloudburst gave way, is shown in this telephoto.

IT IS BELIEVED a score of transients were killed. The engineer is known to have met death in the wreck.—(Telephoto from International News Photos.)

Irresistible --- Immovable ---



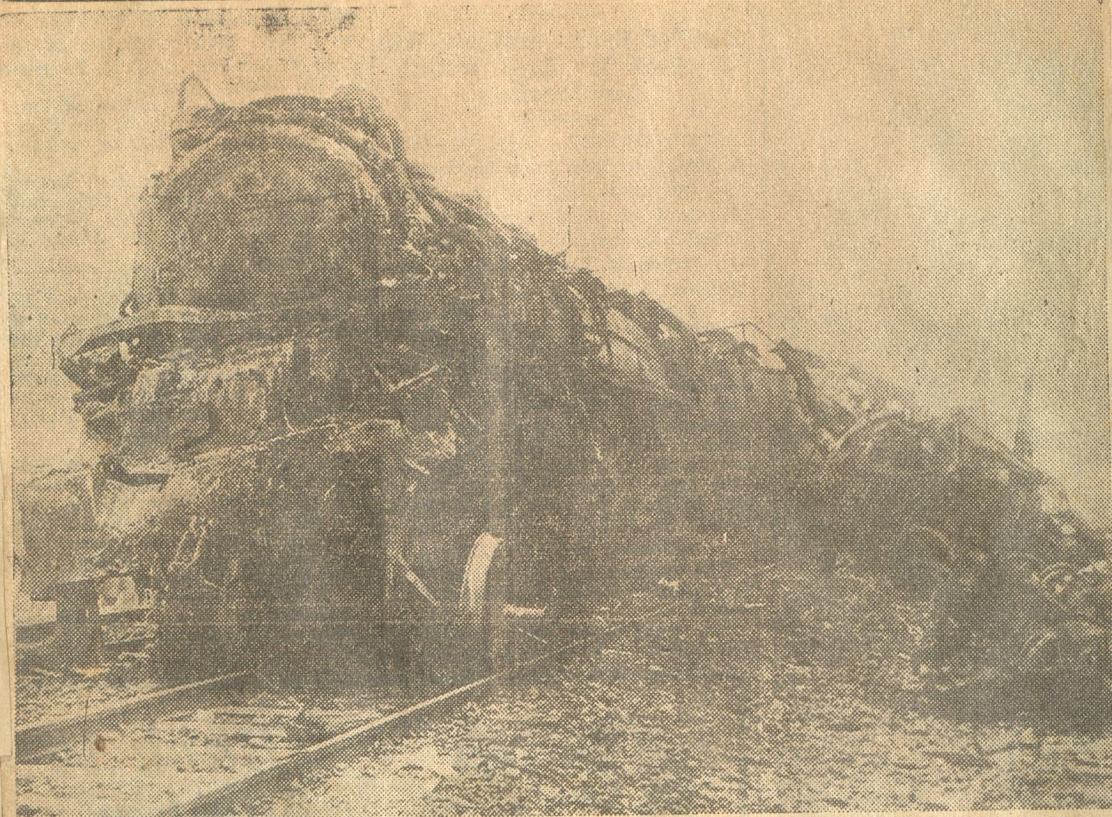
WHEN these two rail giants crashed together at Pittsburgh, twenty-three were hurt, four seriously. The crash came when a freight engine and a commuters' train engine met head-on in the Pennsylvania yards.

Where Flood Took Toll



HERE is the wrecked locomotive of the Southern Pacific train that was swept from the rails during the cloudburst in Tehachapi Pass. The death toll is believed to be around forty.

When Death Rode Rails In France



Here is the locomotive of the Strasbourg Limited after it rammed the Nancy Express, fog-bound fifteen miles from Paris. More than 200 persons died as the result of the heavy engine crashing through eleven wooden coaches of the stalled express. —Associated Press Photo.

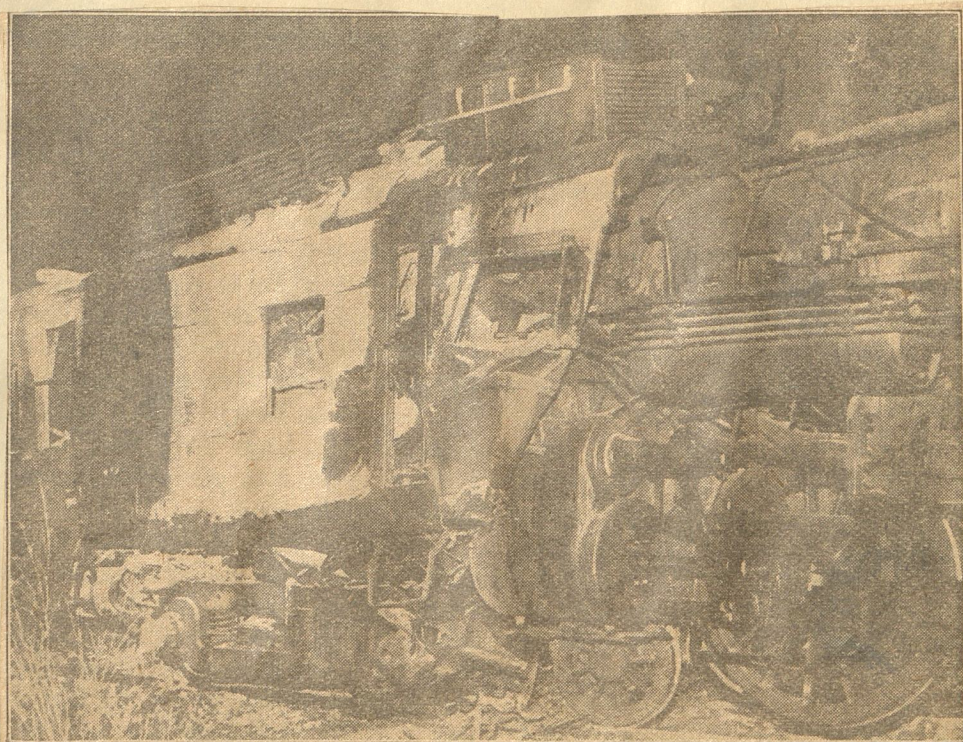
Locomotive Goes To Sea



A pounding sea surf was the grim and unusual destination of a Japanese passenger train when the embankment over which it was speeding on the Shinyestu Railroad collapsed near the Niigata shore. The wreck, in which three passengers perished, is here shown strewn on the rocky embankment.



THIS picture shows what happens when a trestle gives away beneath a train. This happened yesterday near Clio, in Plumas County, when the California Fruit Exchange train carrying fifty lumberjacks broke through a trestle over Willow Creek. Twelve men were injured, none seriously. Seven of these were treated at a Portola hospital.



Juice vs. Steam! A Real Tragedy, Not One of Joe Connolly's Harmless Entertainments. Four Good Railroad Men Died and 28 Passengers Were Hurt in This Mixup Between a Burlington Steam Engine and a Gas-Electric Coach Last January 12 at Donnelley, Iowa

LOST, ONE ENGINE



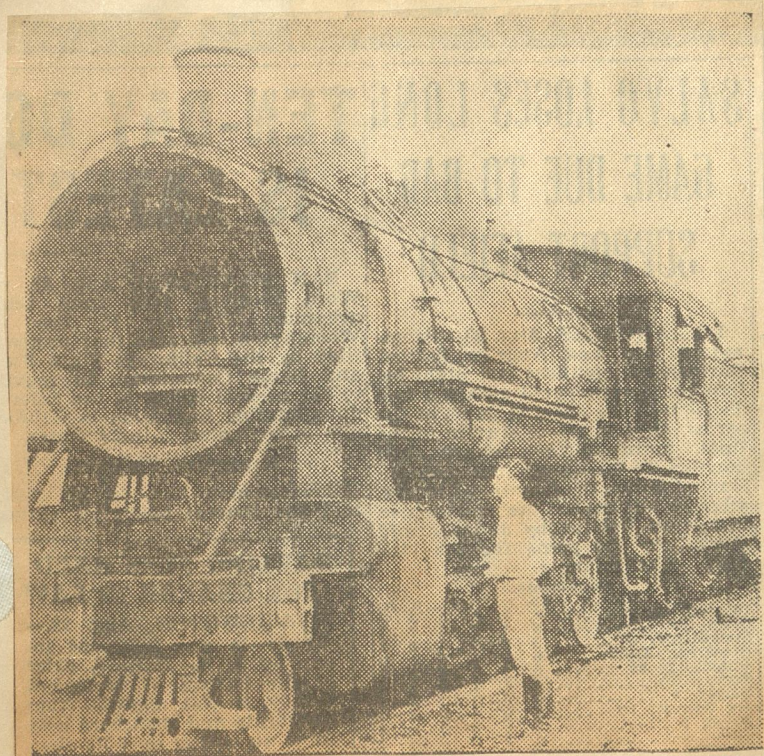
Photos from R. H. Perlee, Santa Paula, Calif., and Dorman's Photo Shop, Bakersfield, Calif.
Santa Fe Engine No. 3834 as It Looked Emerging from under 20 Feet of Mud



About 50,000 Persons Saw This "Cornfield Meet" at Chattanooga, Tenn., in 1913



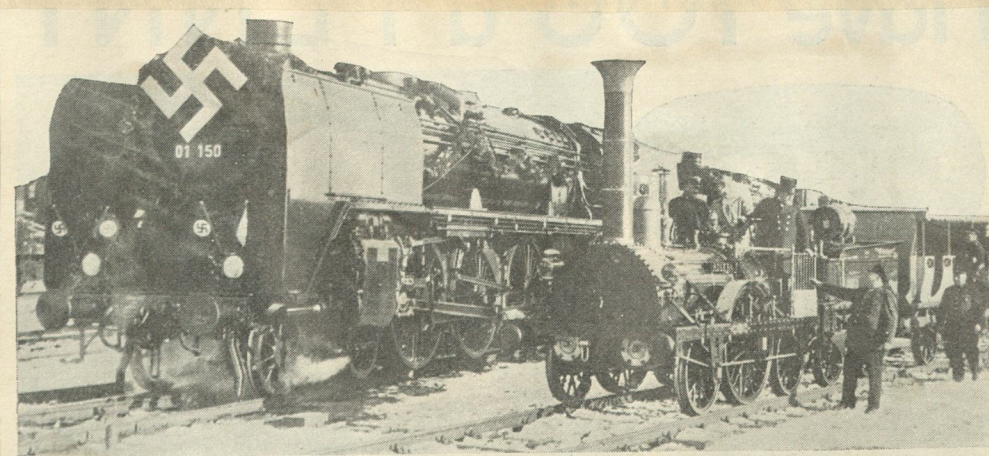
THREE DIE IN WRECK—Three of the crew were killed when a washout caused the wreck of this freight train, at Hudson, Wis., bringing the total of deaths attributable to floods to nine in western Wisconsin and eastern Minnesota.



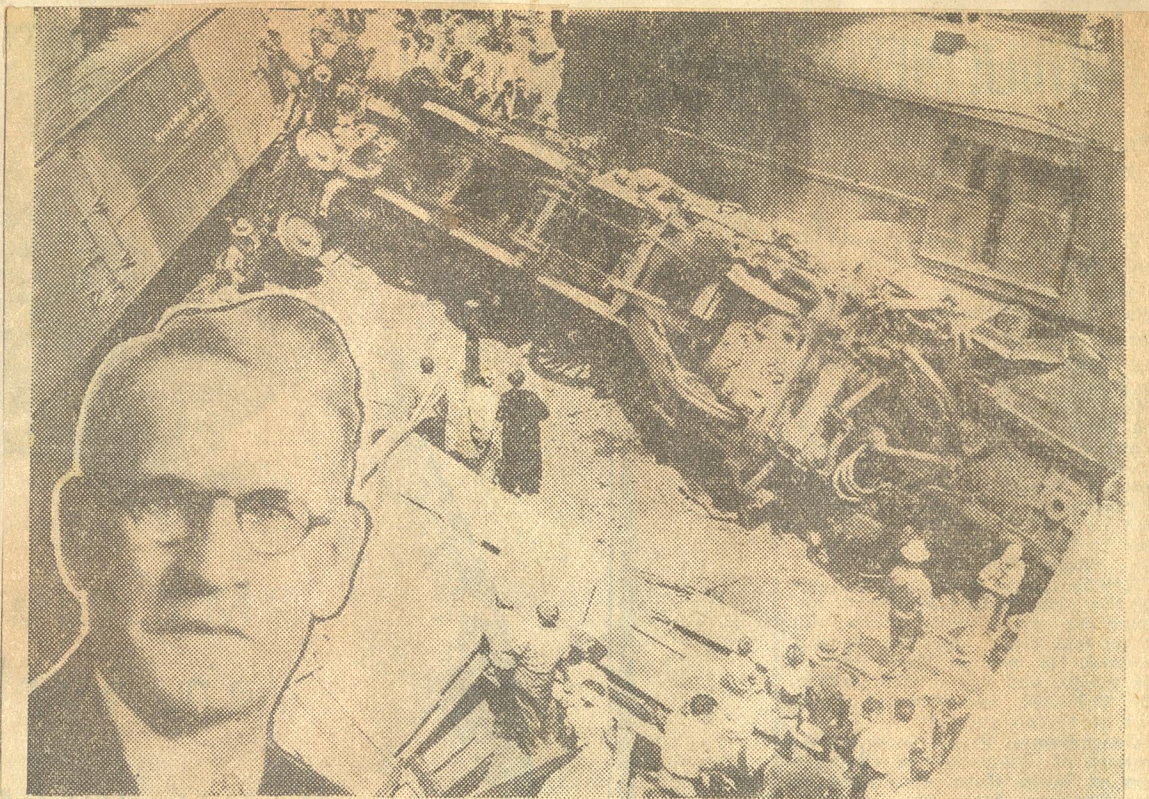
The boiler head of Engine No. 22 was blown out early yesterday in an explosion on a Western Pacific siding at Quartz Station, five miles from Oroville.



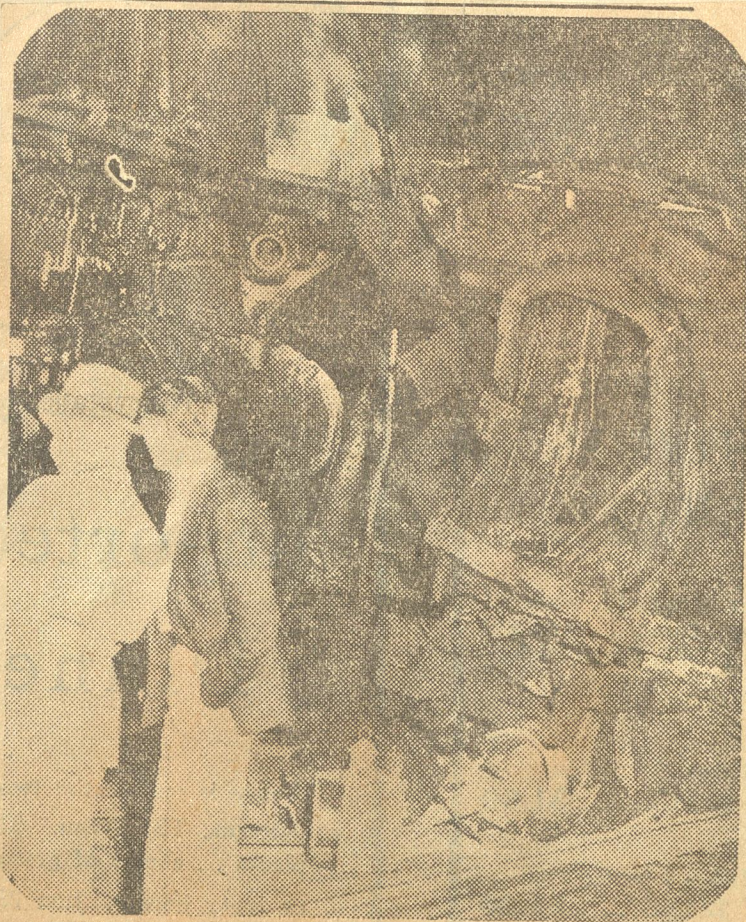
KINDLING WOOD—Eight box cars are reduced to kindling wood as a freight train leaves the rails near Nashville, Tenn. All the cars were empty except one that was loaded with wood. No one injured.



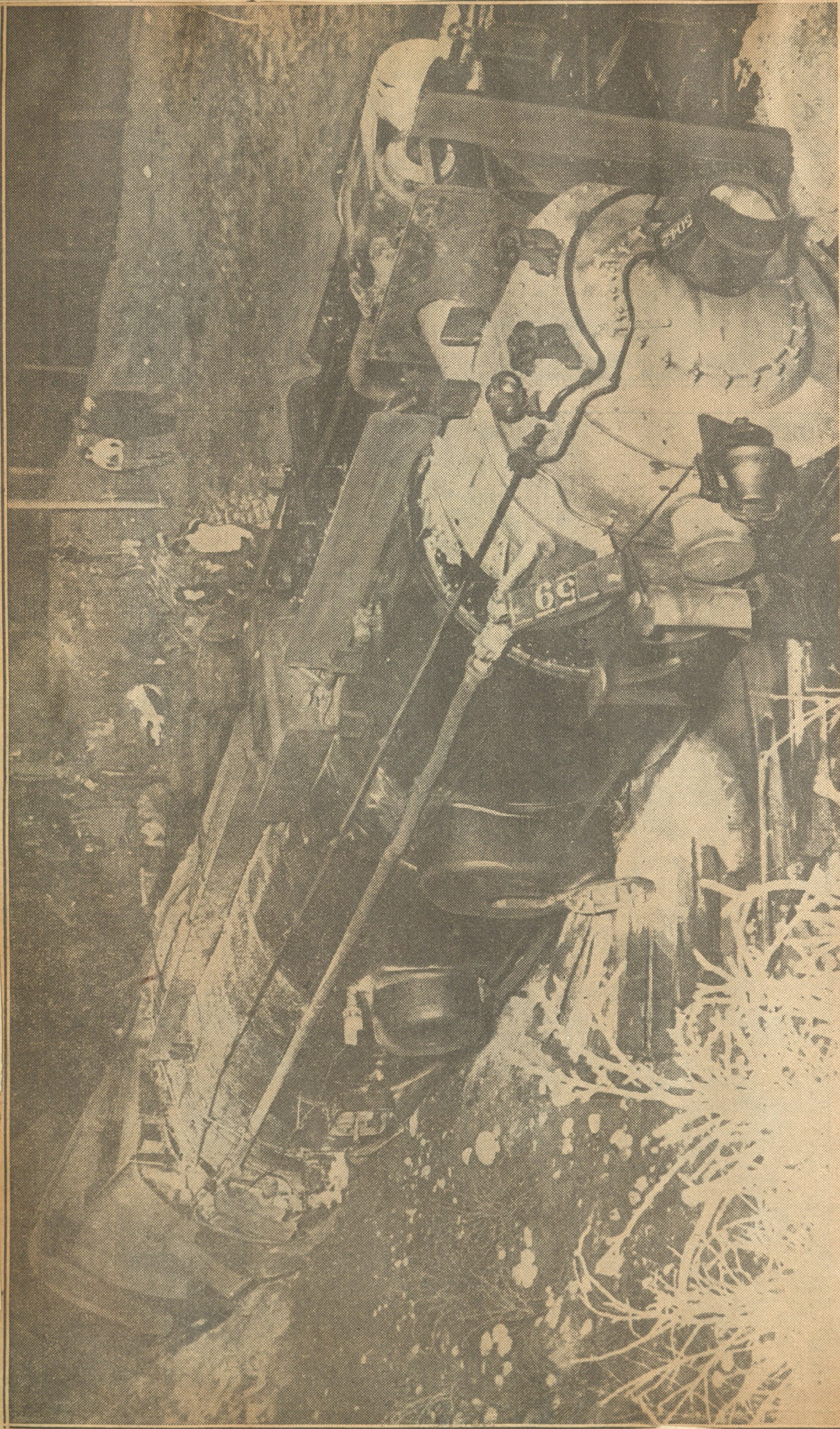
A century of German railroad history is shown in this picture, depicting reproduction of the "Adler," the first German locomotive, beside one of the latest types



This Southern Pacific passenger killing three and injuring three M. Farley, inset, and an itinerant were killed at the time. A. W. locomotive and baggage car left others and crashing into an SERA Schlitter, fireman, died to-day of the rails near Manteca yesterday labor camp. The engineer, Charles burns. —Associated Press Photos.



TRAIN CRASH KILLS ONE, IMPERILS SCORES—This shows the wrecked coaches and locomotive of a Lake Placid, N. Y., special train after being smashed in a rear-end collision by a crack Montreal flyer, near Peekskill. A brakeman was killed and scores of passengers narrowly escaped death when they were hurled from their seats and berths.



RECKLESS, RUTHLESS OUTRAGE

—This eloquent photograph shows the crack Southern Pacific West Coast Limited, derailed by a bandit near Saugus, Cal. The desperado strolled

through the coaches, herding the wounded and panic-stricken passengers into one undamaged coach where he robbed them, after which he fled into the night. The engineer was wounded. The bandit was captured, convicted and sentenced for life in

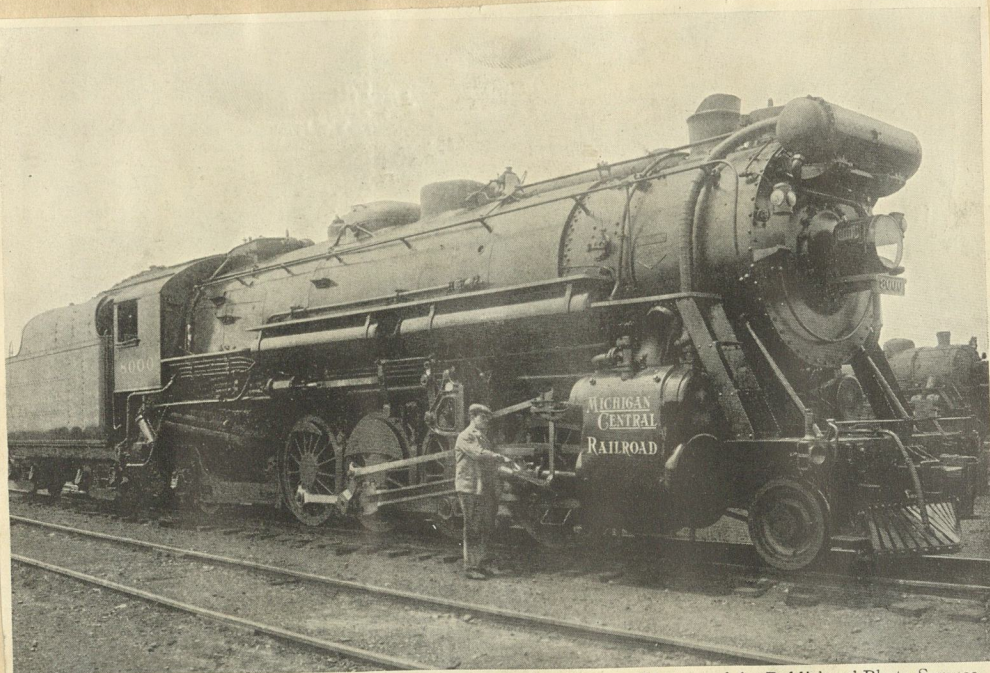
San Quentin. This might easily have been a holocaust, though luckily no one was fatally hurt. But American criminals seem to have entirely dismissed the value of human lives as a deterrent element against their brazen plundering.



Photograph by International

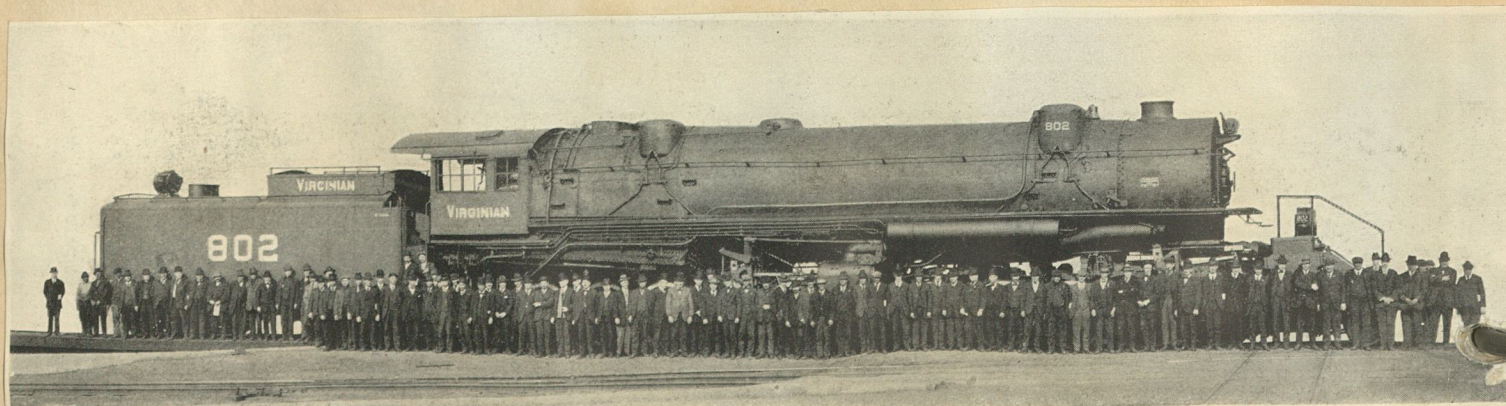
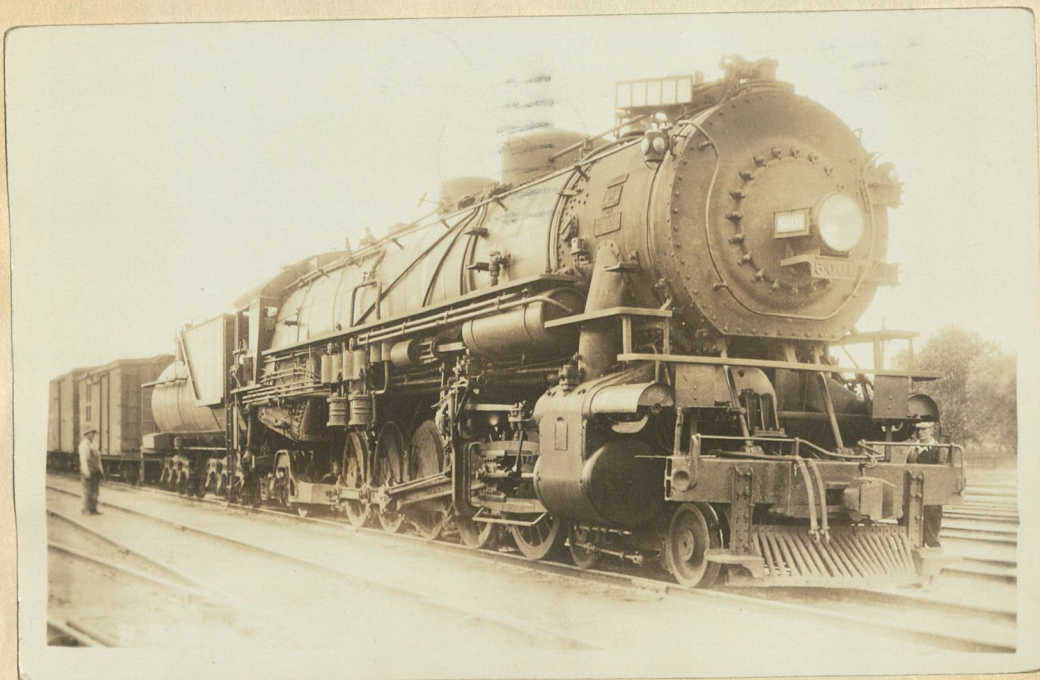
RESULT OF A REAR-END COLLISION AT SULPHUR SPRINGS, MISSOURI

Automatic train-control devices that mechanically stop trains on the safe side of the danger line when the engineer fails to do so are in daily operation, with such positive results that the Interstate Commerce Commission is taking steps to make their installation compulsory on all the main railroads. These controls warn against defects in the tracks, causing broken circuits, as well as against defects in their own apparatus. Furthermore, they exclude all trains from any block occupied by another train. The Chicago & Eastern Illinois has had a whole division equipped for several years, with a record of not a single collision on the tracks thus protected.



Photograph by Publishers' Photo Service

A BIG ENGINE OF THE MICHIGAN CENTRAL



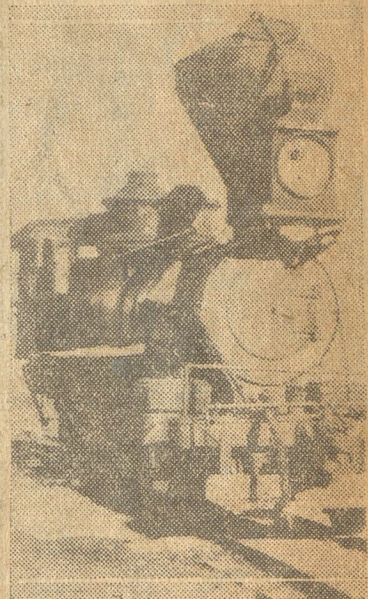
THE LARGEST "IRON HORSE" IN THE WORLD

This tremendous steed of the rails is the one that hauled a 17,500-ton train across south-side Virginia (see page 367), thus setting a world's record that will probably hold good longer than most railroad records do. It was built at the American Locomotive Works.



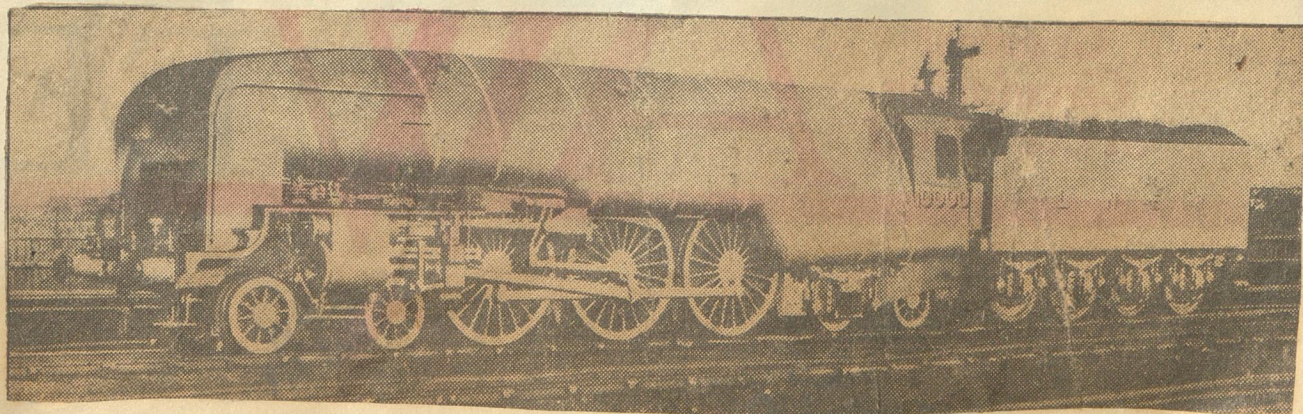
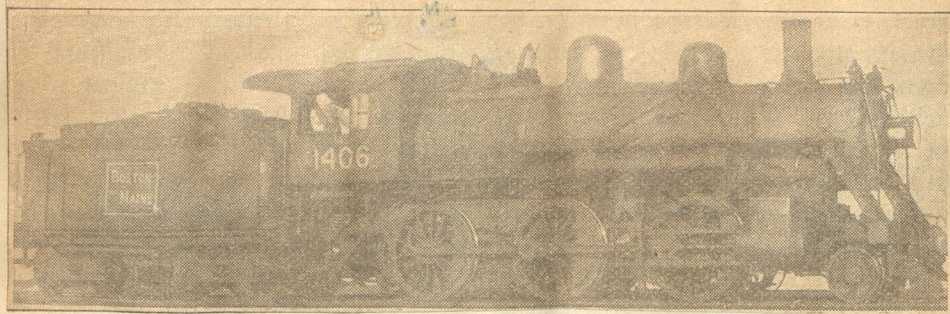
The De Luxe Atlantic & Pacific Express of the Seventies

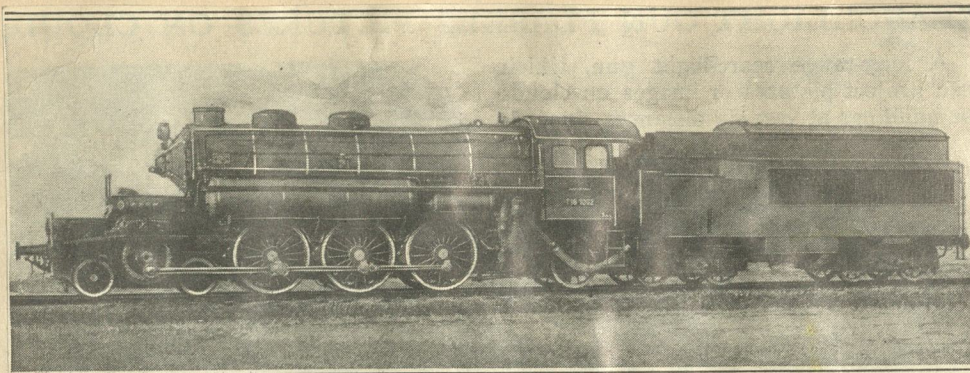
No Place To Go!



THEY also serve who only stand and wait might apply to the old Truckee-Tahoe Railroad engine, No. 1, which was sidetracked and abandoned six years ago at Tahoe City. Its only use now is to allow its cab windows to serve as a framework for "Uncle Harry, Aunt Sue and the twins", when tourists take pictures for the folks back home.

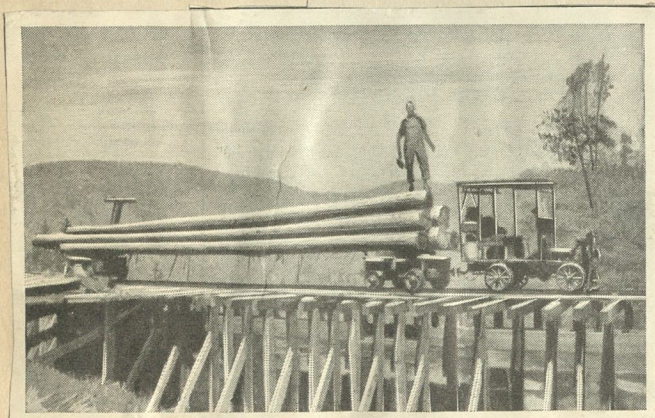
Locomotives of the Boston & Maine Railroad





Turbine Locomotive Built in Germany That Eats Its Smoke and Drinks Its Steam, Using Same Water Over and Over by Condensing Exhaust, Thus Eliminating Stops to Replenish Supplies

Engines Eat Their Smoke and Drink Steam



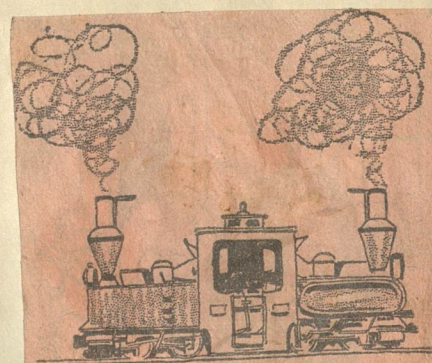
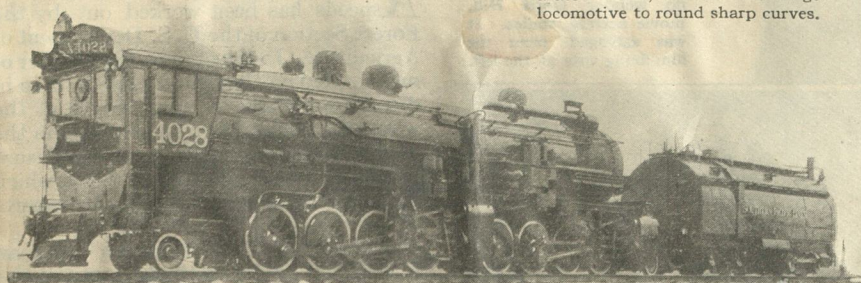
One of the Oddest Railroads in the World; It Is Built on Top of a Flume and the Engine Is an Old Motor Truck



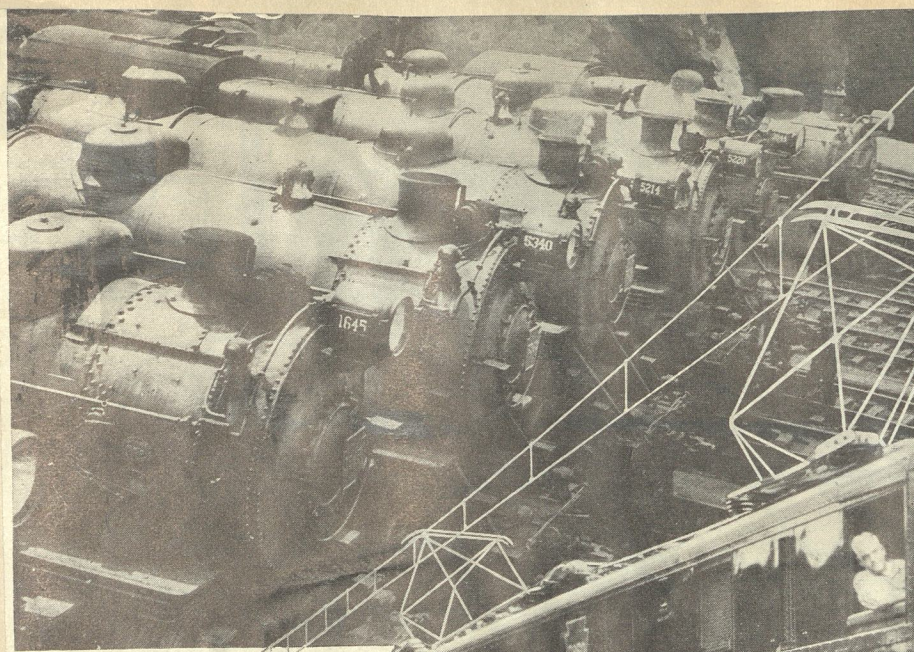
AIR-PROPELLED LOCOMOTIVE

Newest Locomotive "Cart before the Horse"

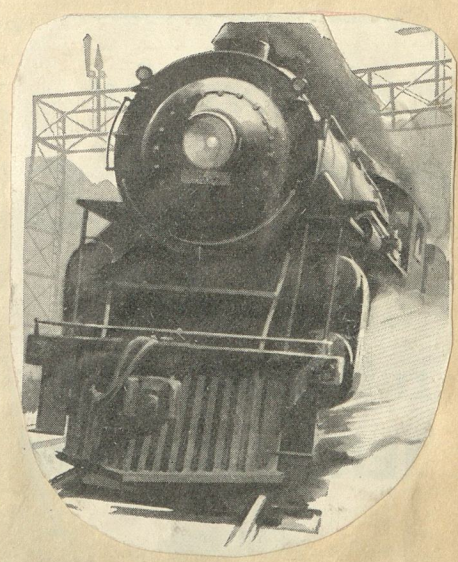
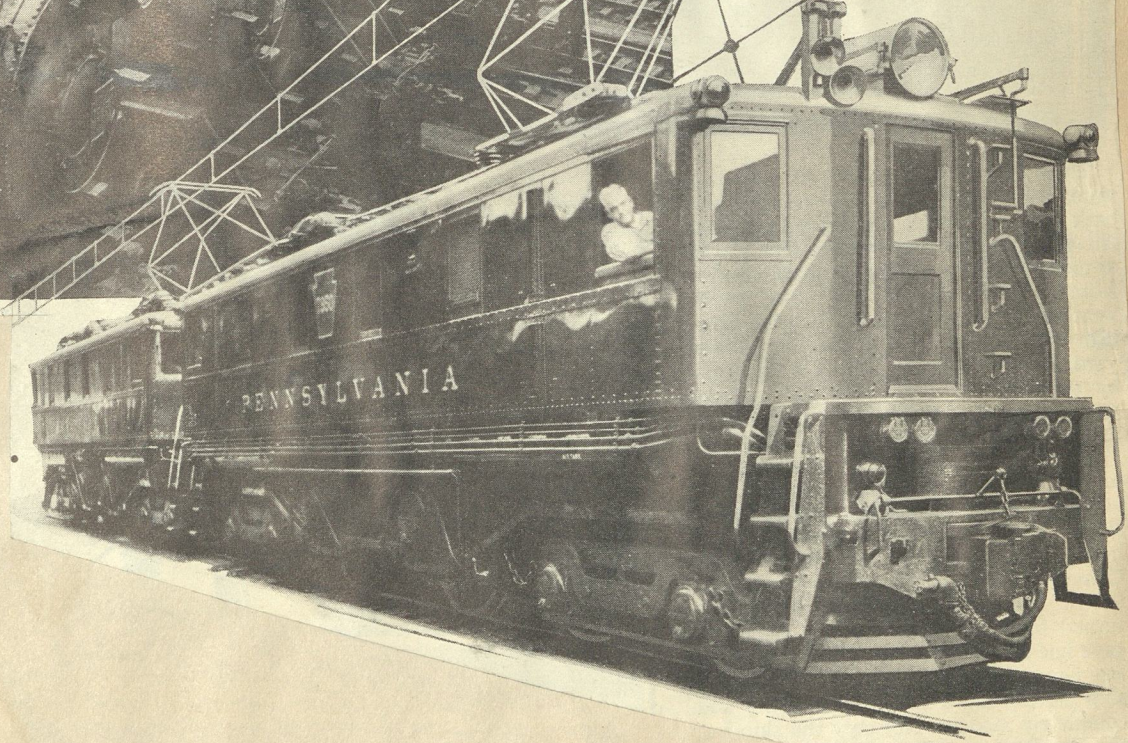
Two sets of drivewheels, on separate trucks, enable the huge locomotive to round sharp curves.



A LOCOMOTIVE THAT
COULDN'T BACK...
IT RAN FORWARD
EITHER WAY....
USED IN FRANCE DURING
THE WAR

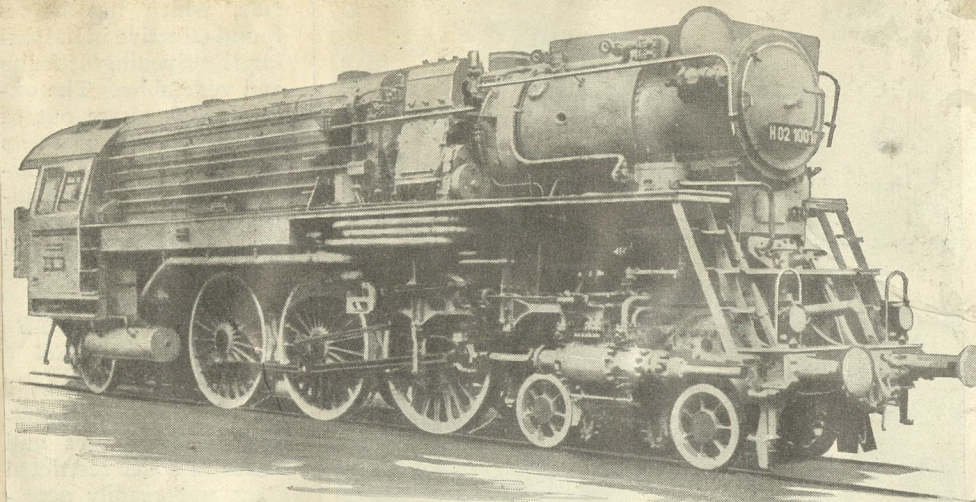


*Electrification of
Pennsylvania R. R.
on Gigantic Scale May
Presage End of the
Steam Locomotive*

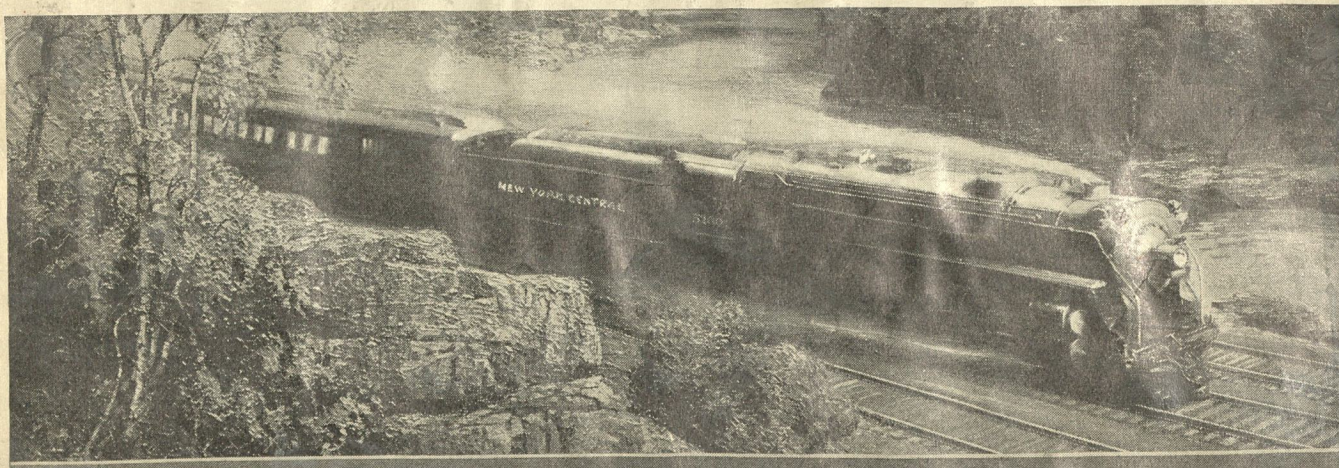


Wide World photograph
Fastest Train in the World
The "Cheltenham Flier" passing through Tilehurst Station on its record-breaking attempt.

LATEST GIANT OF RAILS USES HIGH PRESSURE

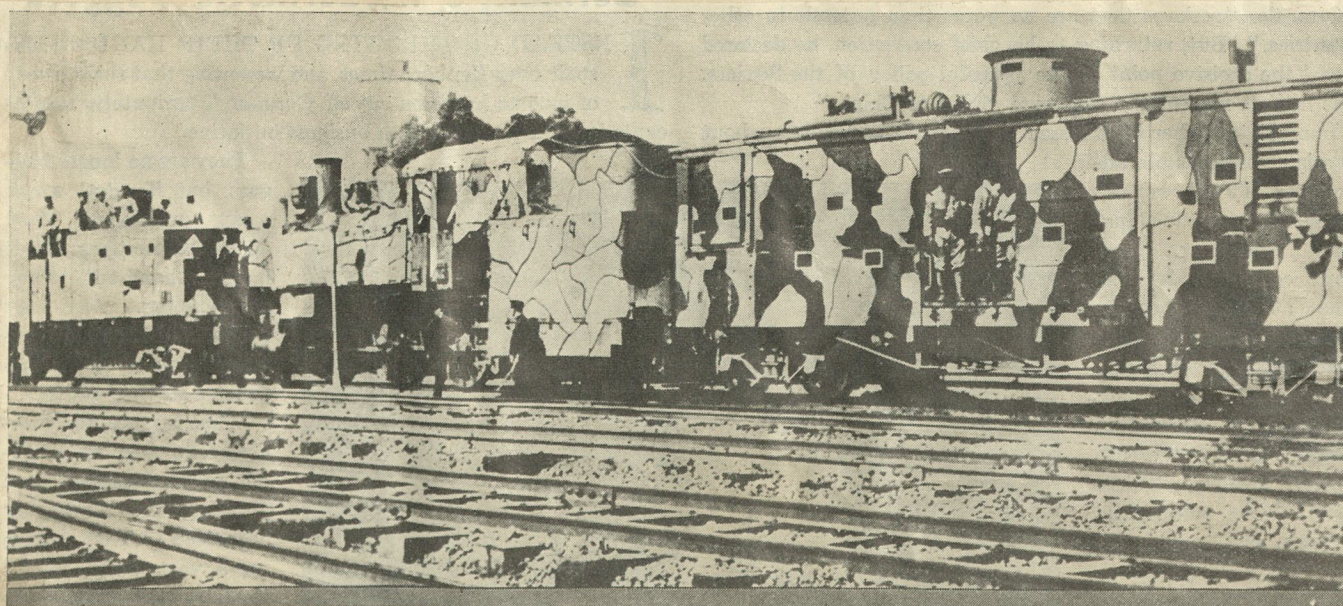


One of the Latest Locomotives Built for the German State Railways; It Develops Steam Pressure of 1,700 Pounds, Weighs 110 Tons and Is About Sixty Feet Long



Courtesy of the New York Central Railroad

The Steam Locomotive Is Emphatically Still in the Race



Acme photograph

Camouflage Days Are Here Again

Armored and heavily armed Japanese trains patrolling the South Manchurian Railway renew memories of transport in the World War.



Fire Fighters



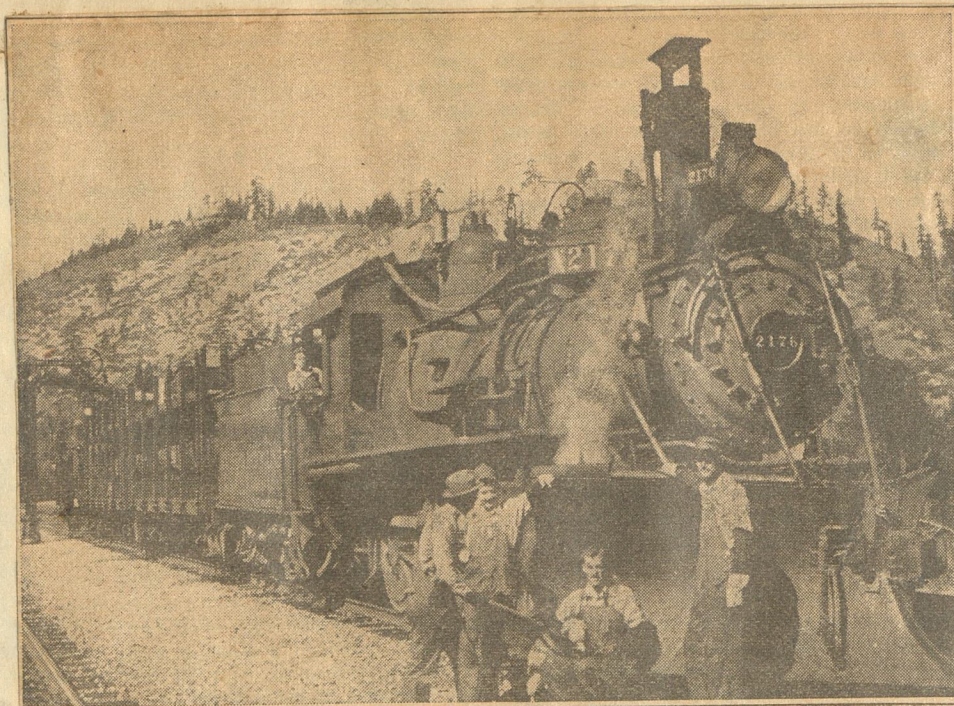
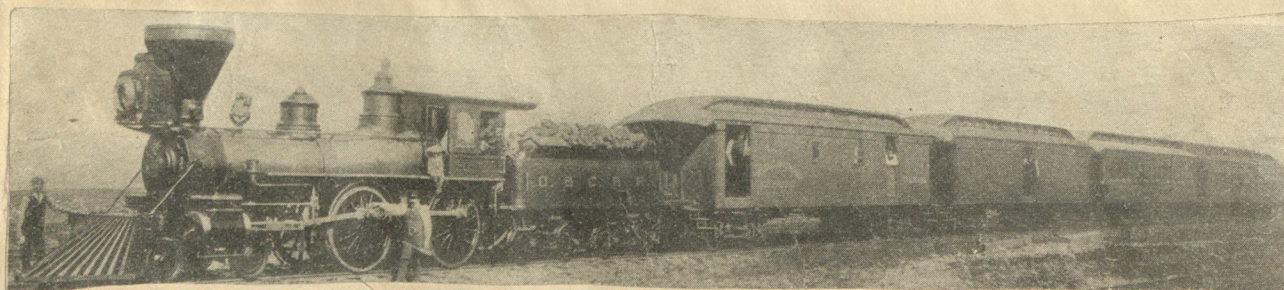
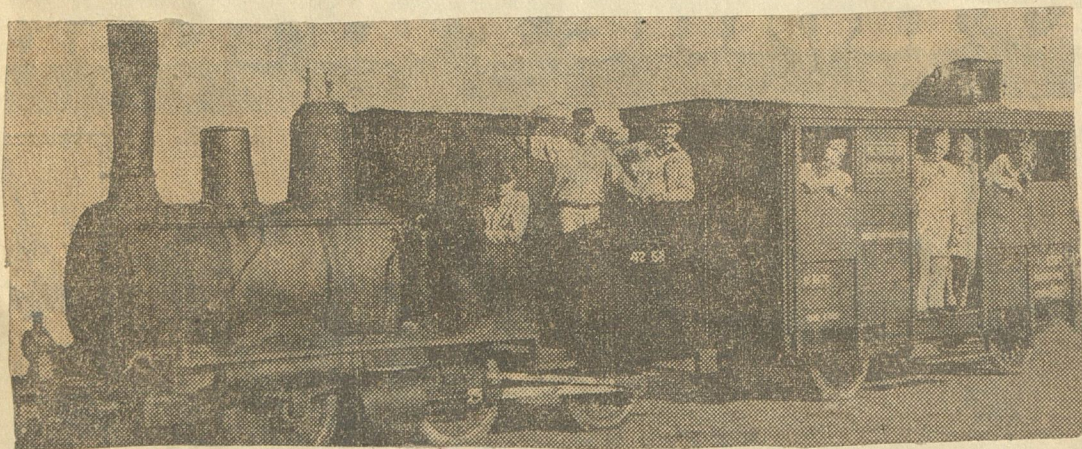
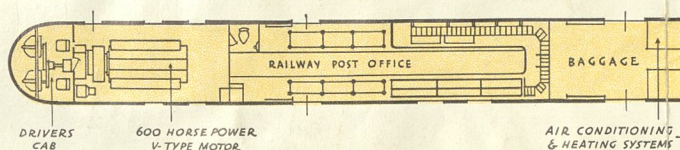
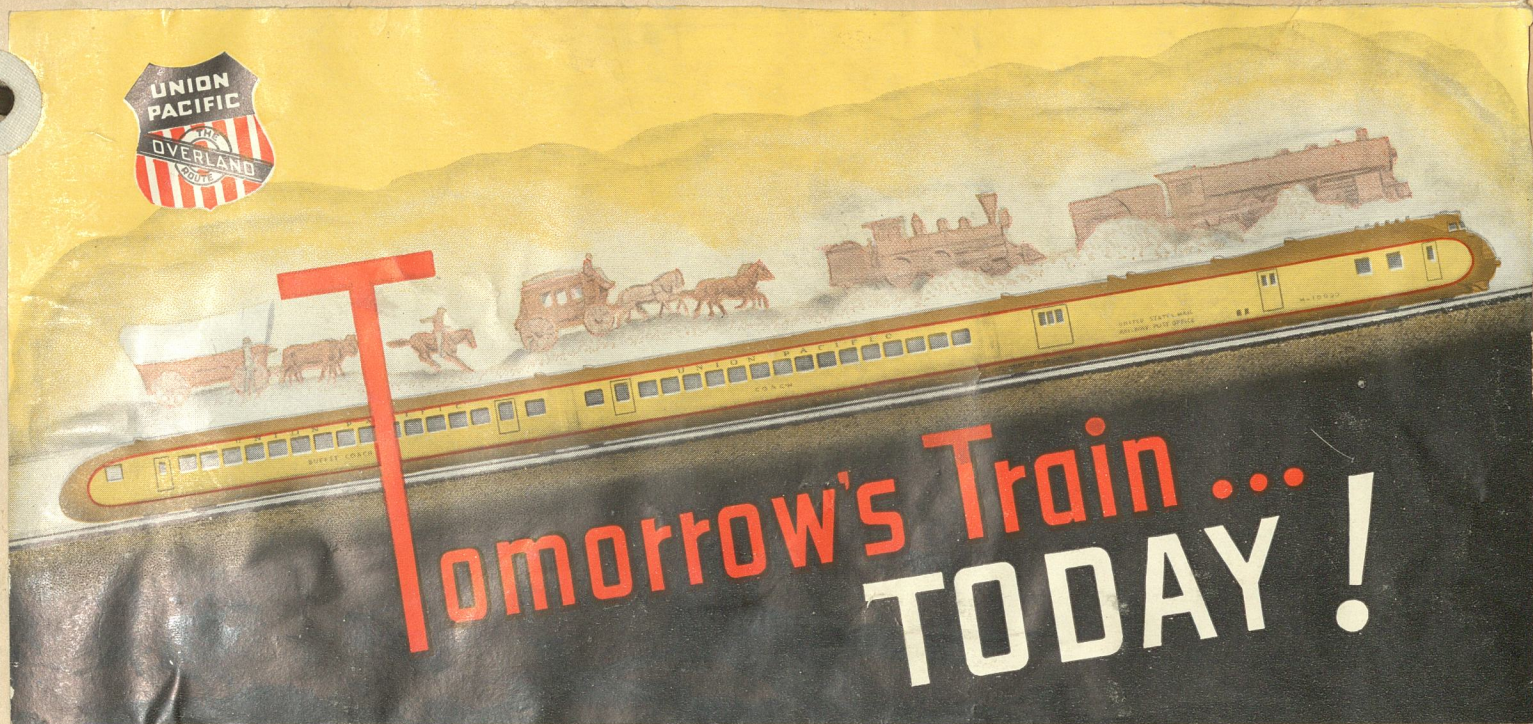


Photo from R. B. Trexler, Daggett, Calif.

One of the Southern Pacific's Fire-Fighting Engines. They Are Equipped with Fire Pumps, Carry Extra Water Cars, and Are Always Ready for Fires in the Mountains





SUPER SPEED—

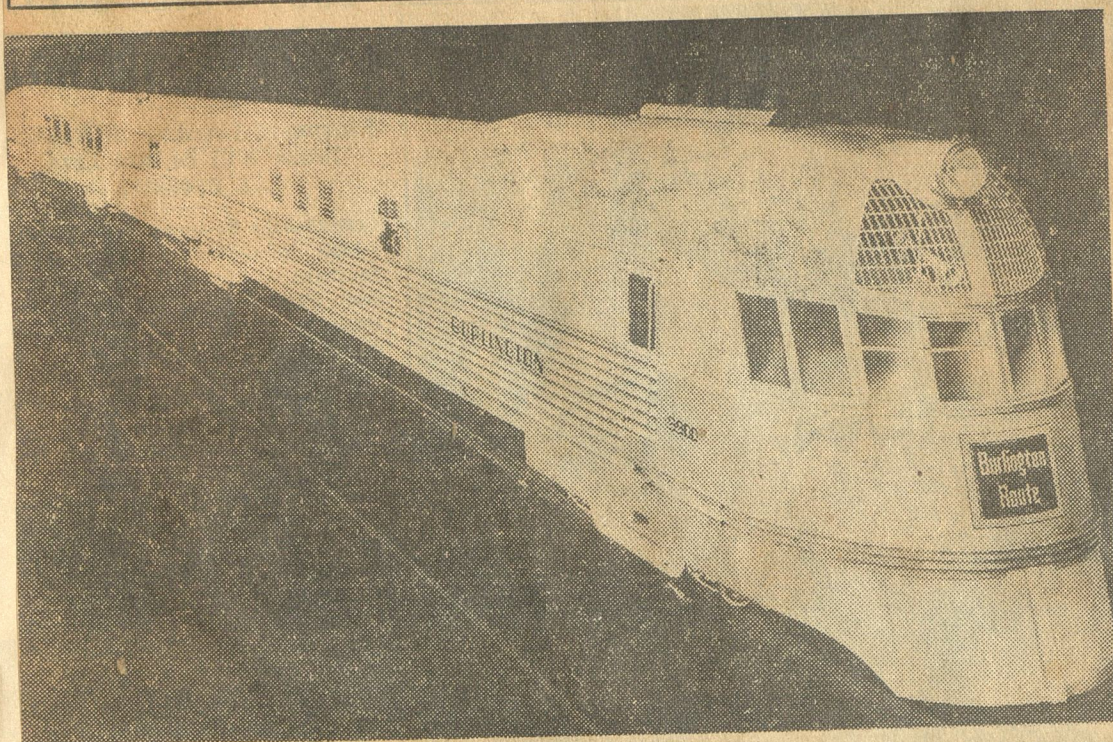
Looking Toward Rear of Last Car.

MODERN ART entered the field of rail car construction on Union Pacific's new train. The exterior is an unusual blending of golden brown and canary yellow separated by a narrow red stripe which extends the entire length of the train and accentuates the stream-lined effect. The interior is striking in its simplicity. The color scheme is blue, shading down from a nearly white ceiling, through the lighter shades of blue to a dark blue below the window sills. There are horizontal bands of polished aluminum showing between the different shades of blue. Window sills are black bakelite. The chairs are trimmed in aluminum and the seats are upholstered in a golden brown tapestry. The floor has a harmoniously colored aisle strip. Window shades are a Venetian blind design and curtain rollers are entirely concealed. The simplicity of the entire decorative scheme creates a pleasing atmosphere of restful beauty.

A second train, incorporating sleeping cars, is under construction.

TOMORROW'S TRAIN.... TODAY

Wings On The Iron Horse



Here is the Zephyr, the new streamline train of the Burlington & Quincy Railroad, which will visit Sacramento Monday, June 25th. The train will be open for inspection between 7 A. M. and 1 P. M. at the Western Pacific Station.

ZEPHYR'S AGENT VISITS CAPITAL

Miklas Makes Arrangements For Fast Train To Stop Here Soon

J. A. Miklas of San Francisco, the traveling freight and passenger agent of the Chicago, Burlington & Quincy Railroad, was in Sacramento this week completing the arrangements for the appearance here of the Burlington Zephyr, the first diesel-powered streamline train.

The Zephyr will be open for inspection at the Western Pacific Station between 7 A. M. and 1 P. M. June 25th.

At 2:15 o'clock the same day, the train will make a short stop in Marysville and another brief visit an hour later in Oroville.

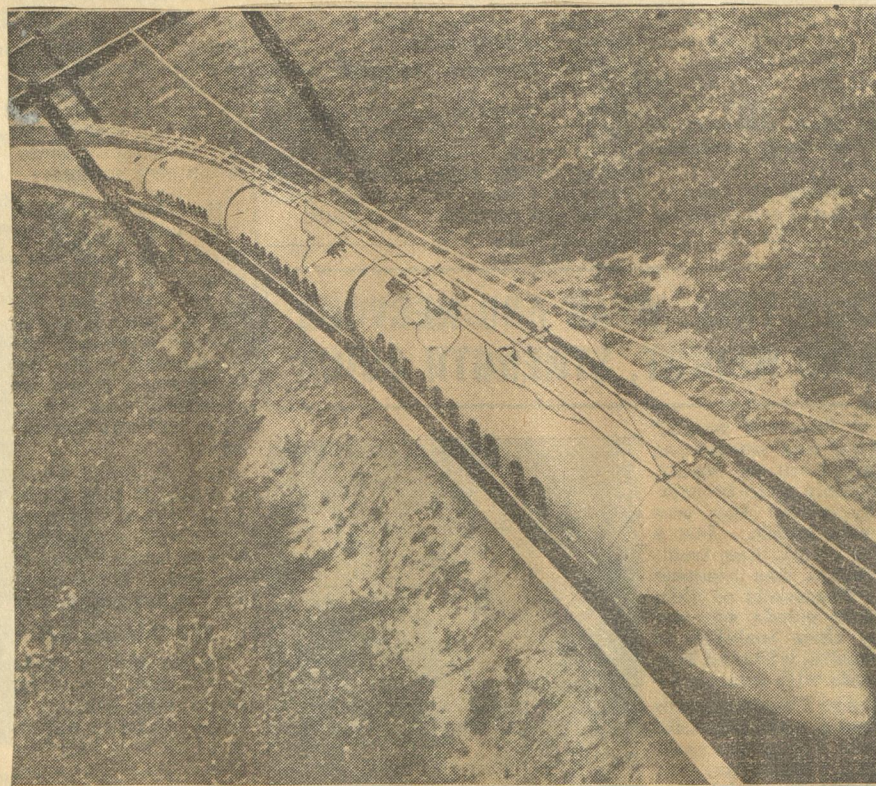
The Zephyr set a world's non-stop record on May 26th by traveling between Denver and Chicago, 1,015 miles, in thirteen hours and five minutes, averaging 77.5 miles per hour and reaching a maximum speed of 112.5 miles.

The train is built of stainless steel and rides on articulated trucks.

All of the passenger compartments are air conditioned and the windows are of shatter-proof glass.

The train is 197 feet long and has accommodations for seventy-two passengers.

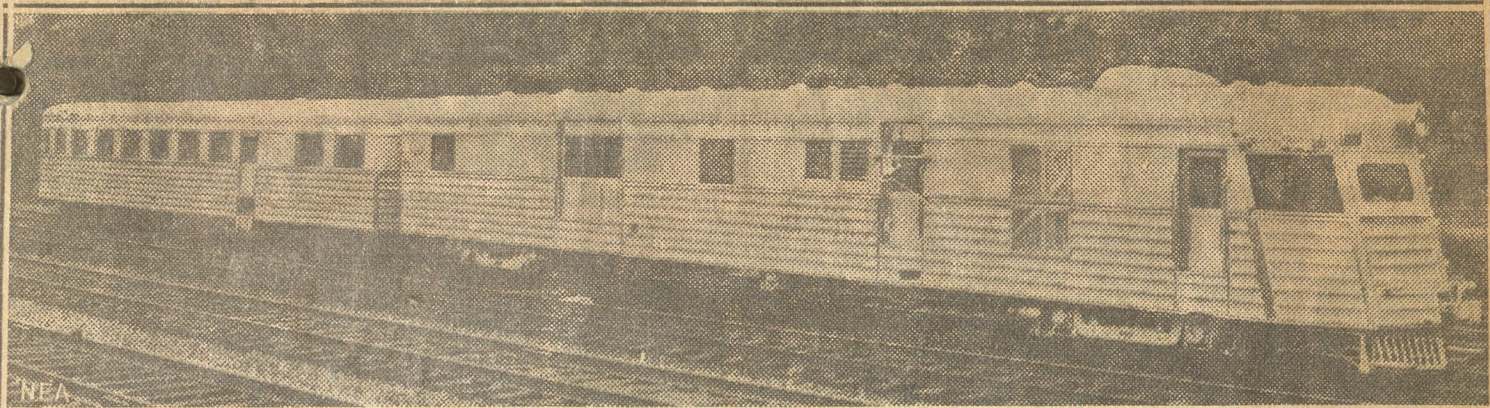
The Zephyr is en route to A Century of Progress Exposition in Chicago.



Acme Newsphoto

20TH CENTURY. NOT PREHISTORIC, MONSTER.—This new electric train, recently tried out near Moscow, Russia, travels on balls instead of wheels, and is so speedy as well as safe that it is soon likely to be brought into general use all over the world.

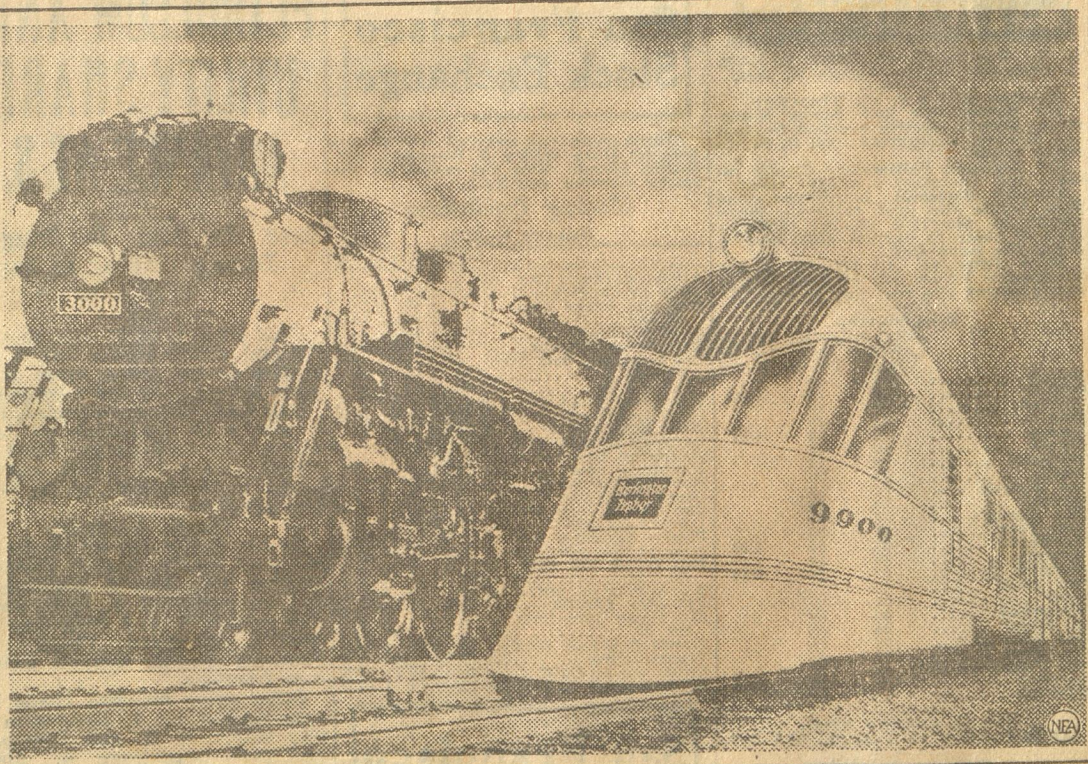
Rubber-Tired Gasoline Train For Texas



It is propelled by gasoline, rides on sixteen pneumatic tires and can make seventy-five miles an hour! These are the interesting features in this new two-car, air-conditioned railroad train, pictured

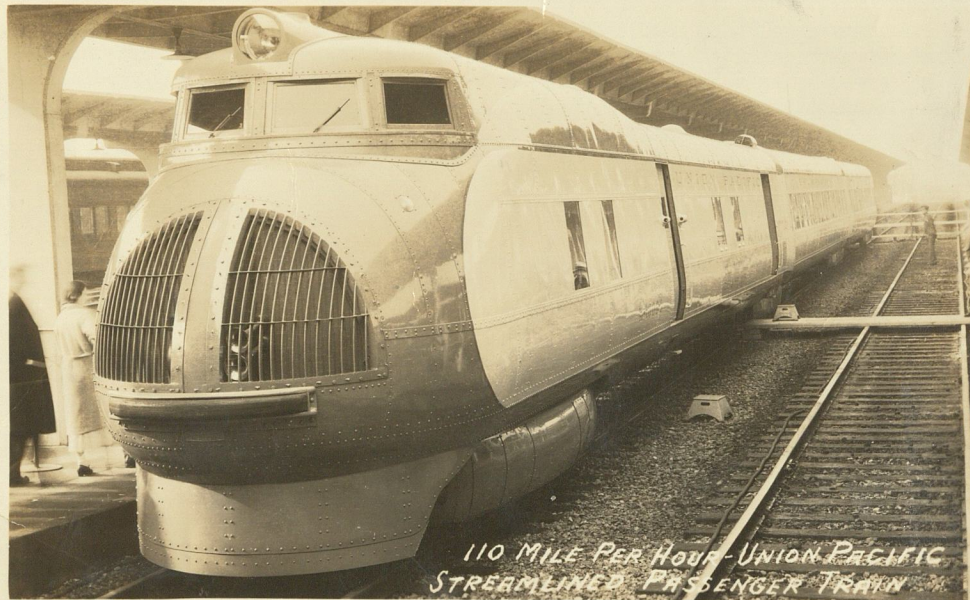
at Philadelphia before making the delivery trip to the Texas and Pacific Railroad. The train will replace the present steam equipment on the Fort Worth-Texarkana run.

Motorized Flier Threatens Steam King's Reign



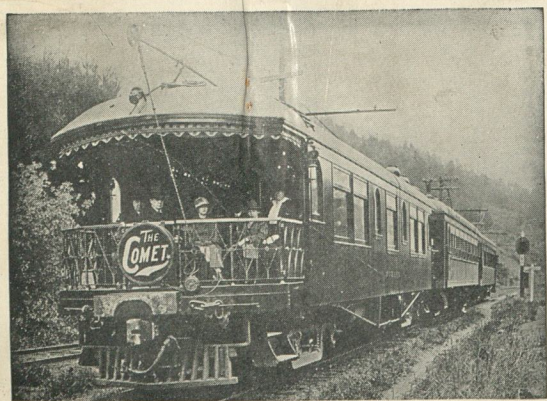
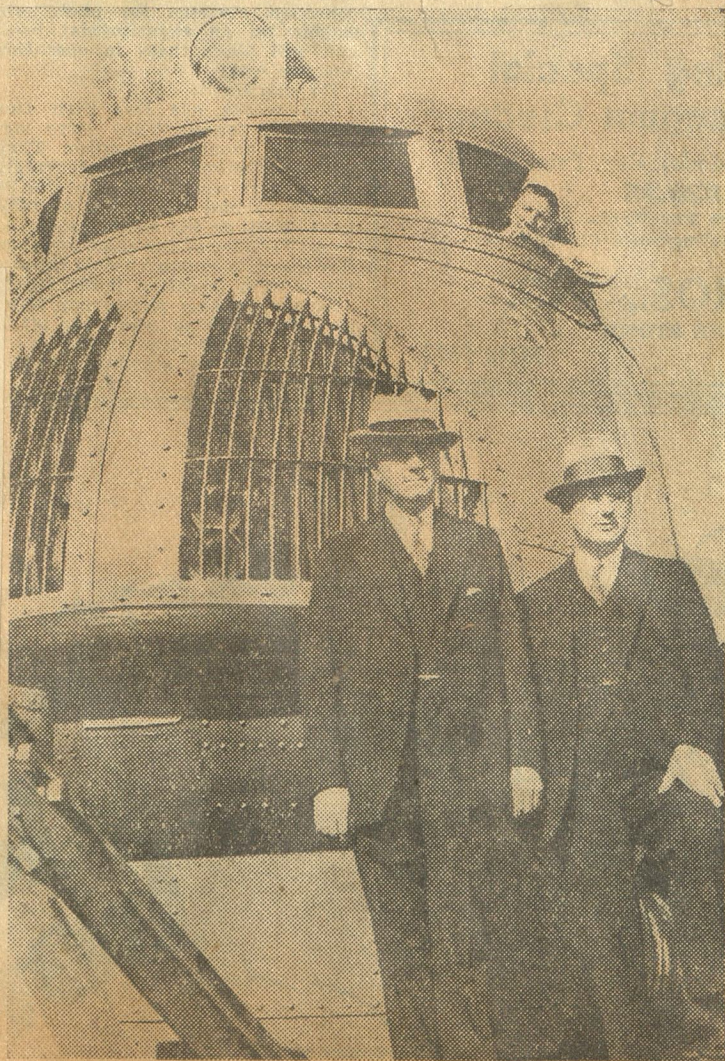
Another revolution in railroading is pictured here—an aristocrat of steam whose reign is threatened and its rival, the Burlington Route's first stream-lined stainless steel motorized train, capable of two miles a minute speed. The Zephyr is nearing completion in Philadelphia shops and will tour the East before going into service. The Aristocrat now pulls a crack Chicago-Denver train on the Burlington. The Zephyr complete weighs only eighty-five tons; the iron horse, with tender, weighs 259 tons.

A New Epoch In Transportation

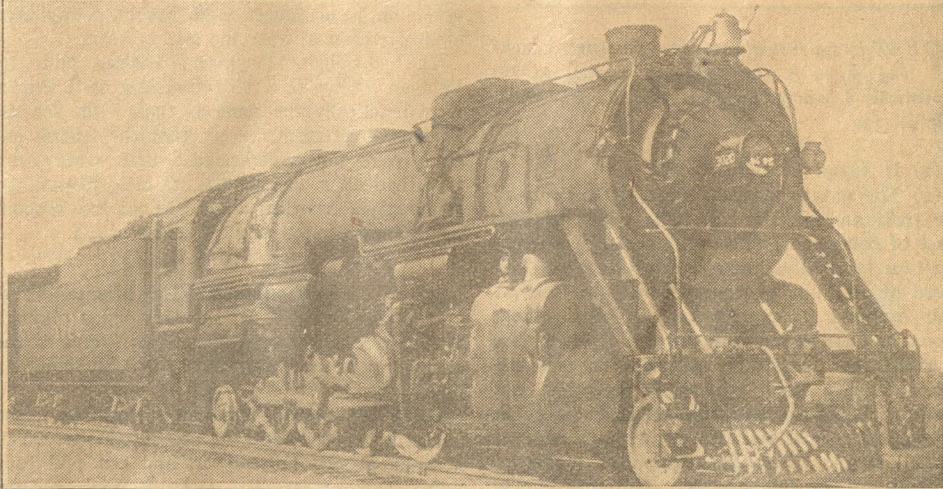
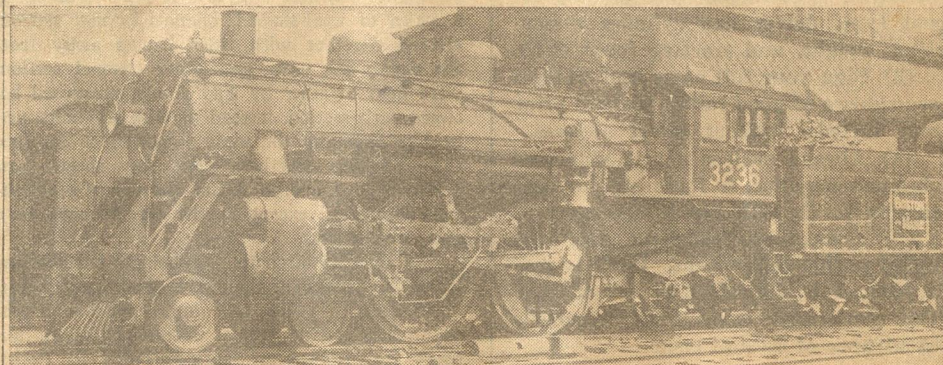
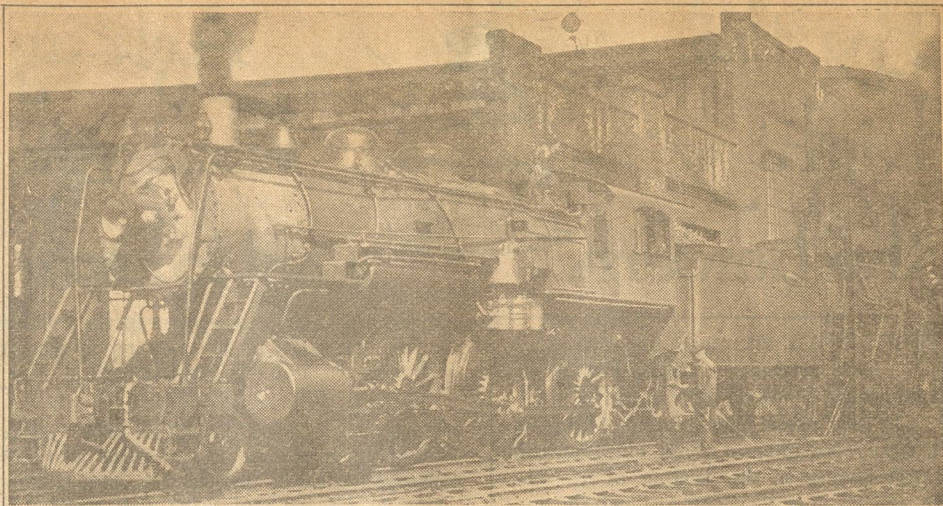


110 MILE PER HOUR - UNION PACIFIC
STREAMLINER PASSENGER TRAIN

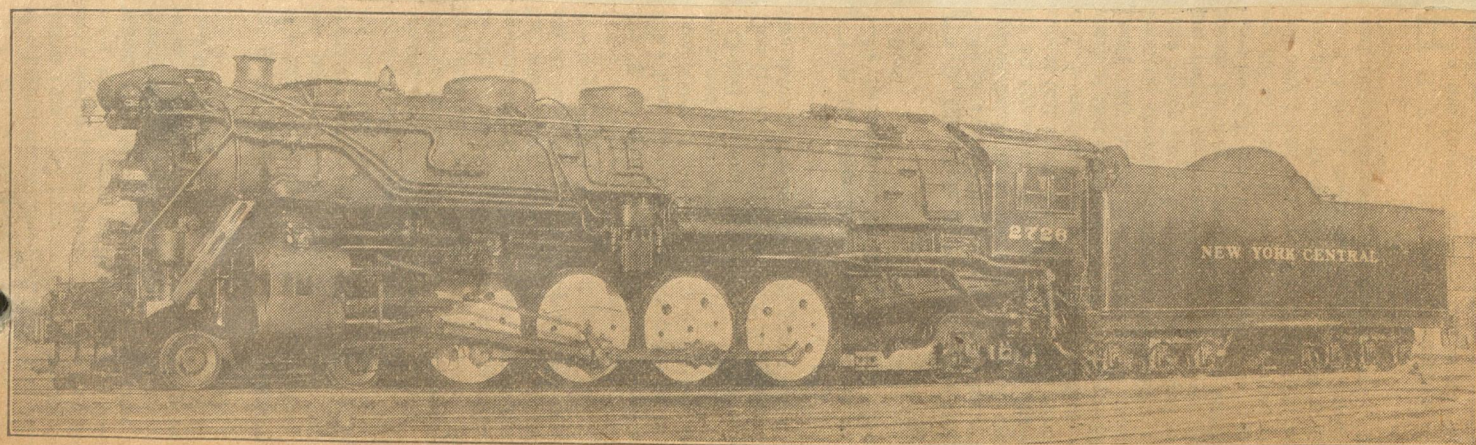
Thousands of Sacramentans are visiting the Union Pacific's new streamlined marvel at the Southern Pacific station, a passenger train capable of making 110 miles an hour. A view of the streamlined streak is at the top. Below, F. W. Robinson, left, vice president in charge of traffic of the Union Pacific, and J. L. Haugh, vice president and assistant to the president, are pictured standing in front of the new train. Both are from Omaha. The engineer is Harry Robinson.



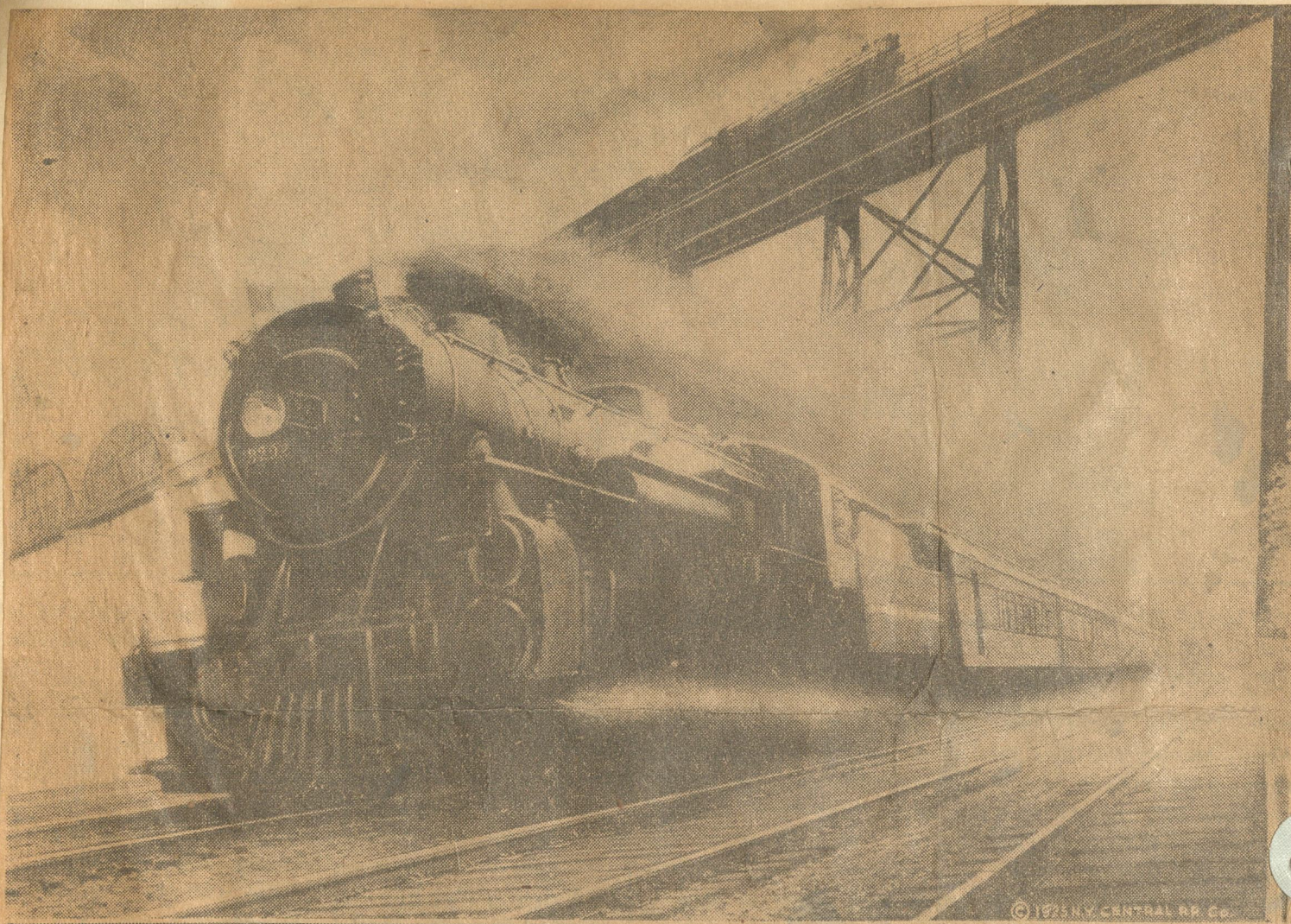
Sacramento Northern Railroad Train



No. 2126 (Top) from Railroad Photographs, 5 Applan Way, Allston, Mass. No. 3236 from Joseph Lavelle Photo Collection. No. 3020 by Warren Fancher, Lawrence, Mass.

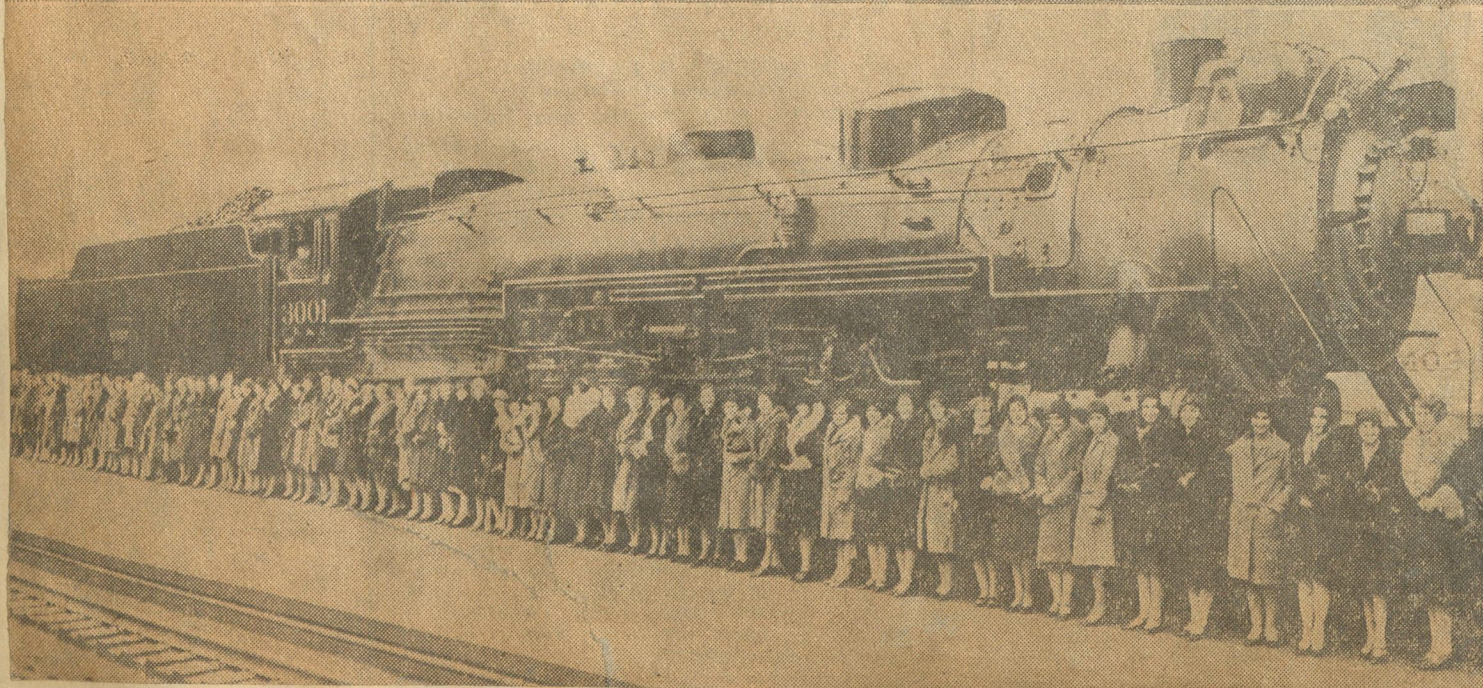


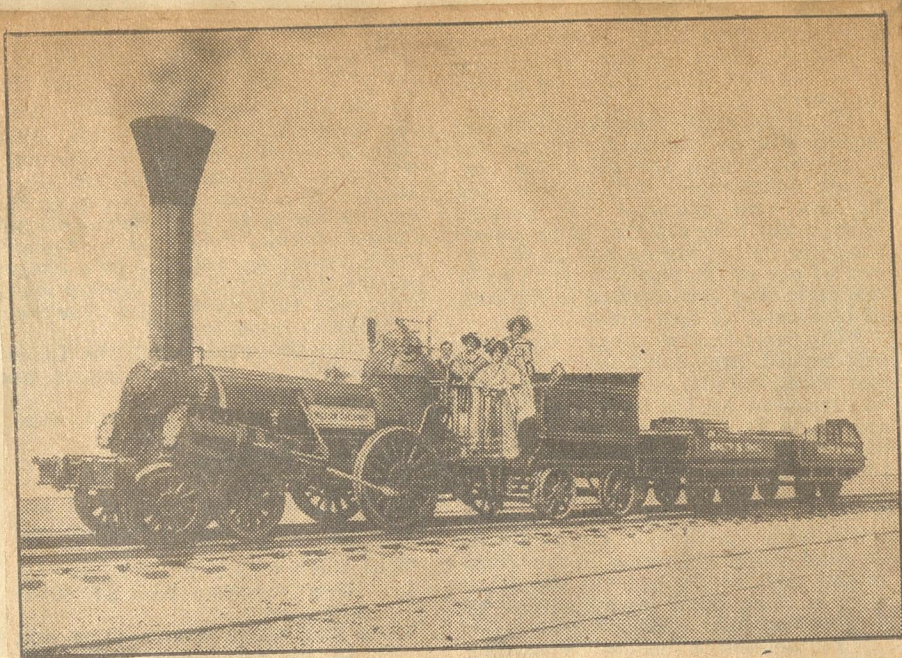
New Double Disc Wheel Centers on N. Y. C. No. 2726. Lighter, Cheaper and Stronger than Spoke Wheels; Will Be Installed on Other N. Y. C. Engines



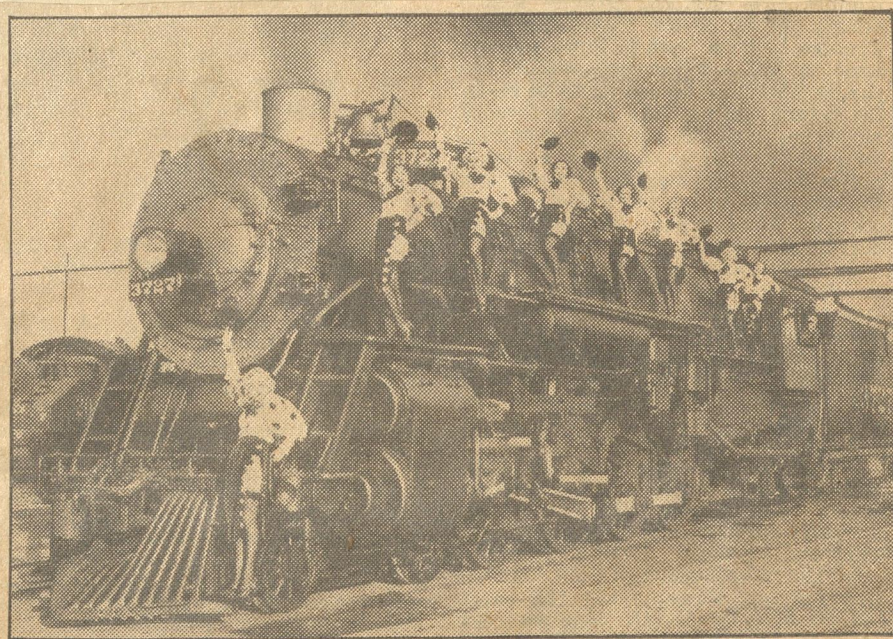
The world's most famous train, the Twentieth Century Limited, passing under the Alfred H. Smith memorial bridge } over the Hudson River. Auto buses are cutting into the rail-
road business.

THIS GIANT OF THE RAILS is one of a fleet of new locomotives taking main line trains out of Chicago. Seventy-four girls are standing beside it. The locomotive, just } a bit less than 100 feet long, has a speed of 85 to 100 miles
per hour for a distance of 500 miles without refueling.—
Picture from International News Photograph Service.

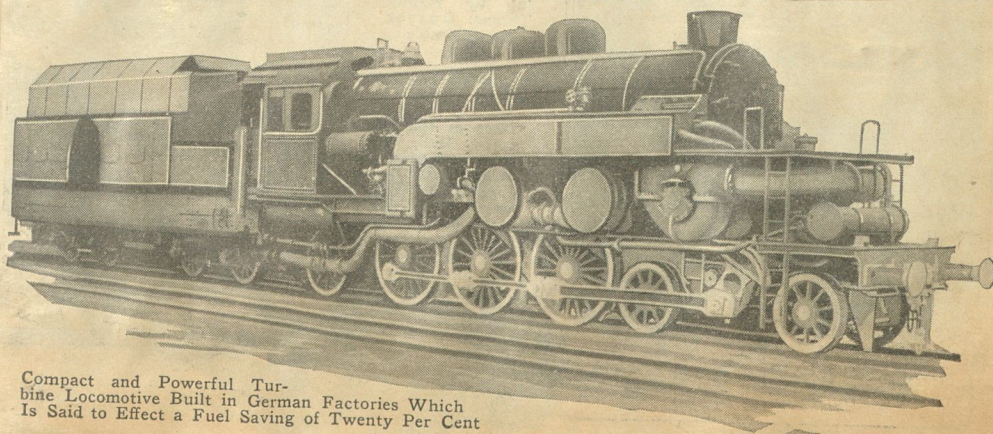




One of the First Six-Wheel Locomotives. It Was Built in 1837 by the Baltimore & Ohio Railroad and Hauled the First Special Train to Be Chartered.

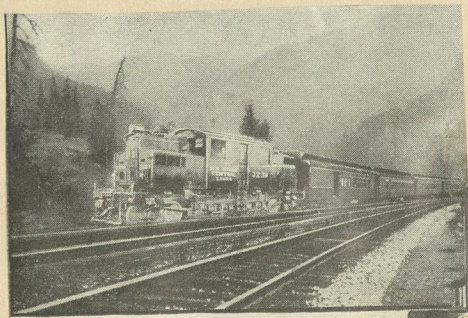
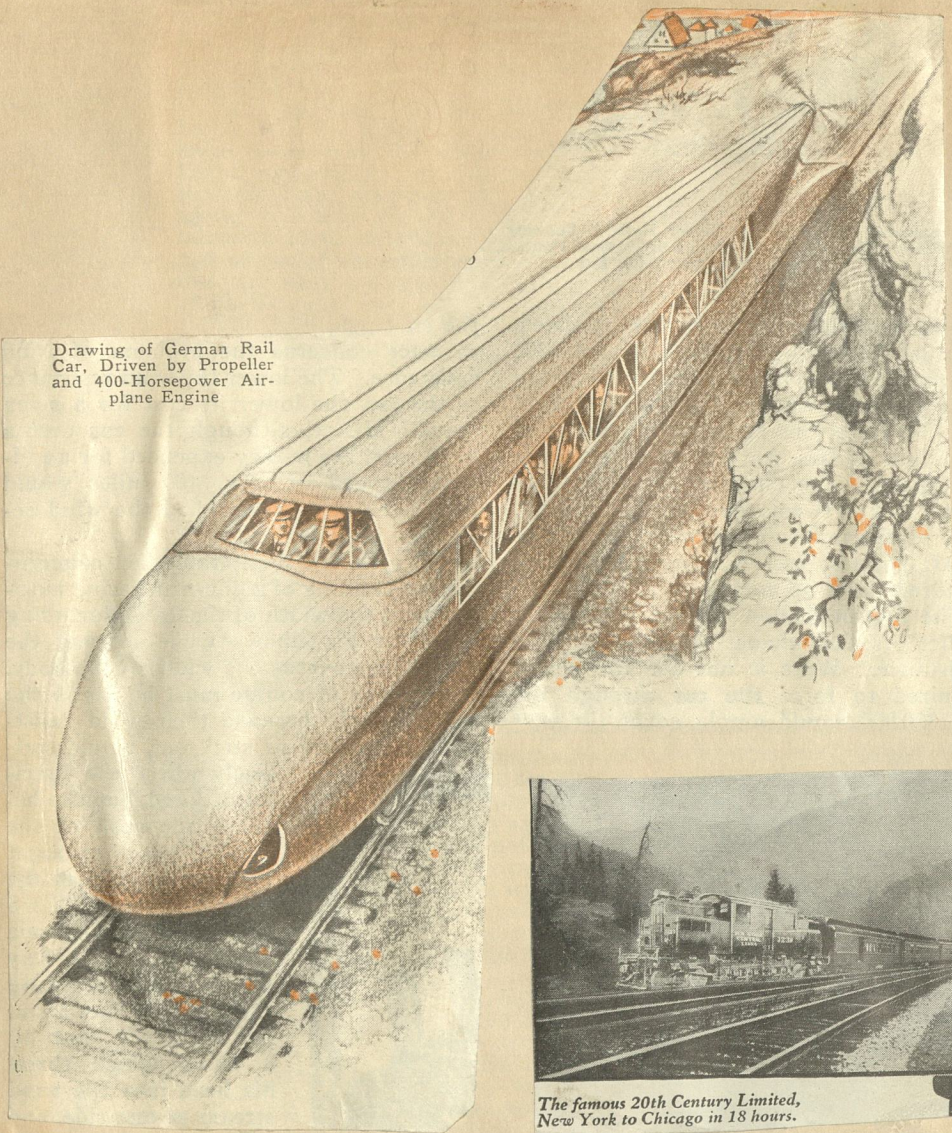


This Great, Puffing Monster Is the Most Modern of Locomotives, and It Is Pulling a Special Train Filled With California Beauties to Washington.



Compact and Powerful Turbine Locomotive Built in German Factories Which Is Said to Effect a Fuel Saving of Twenty Per Cent

Drawing of German Rail
Car, Driven by Propeller
and 400-Horsepower Air-
plane Engine



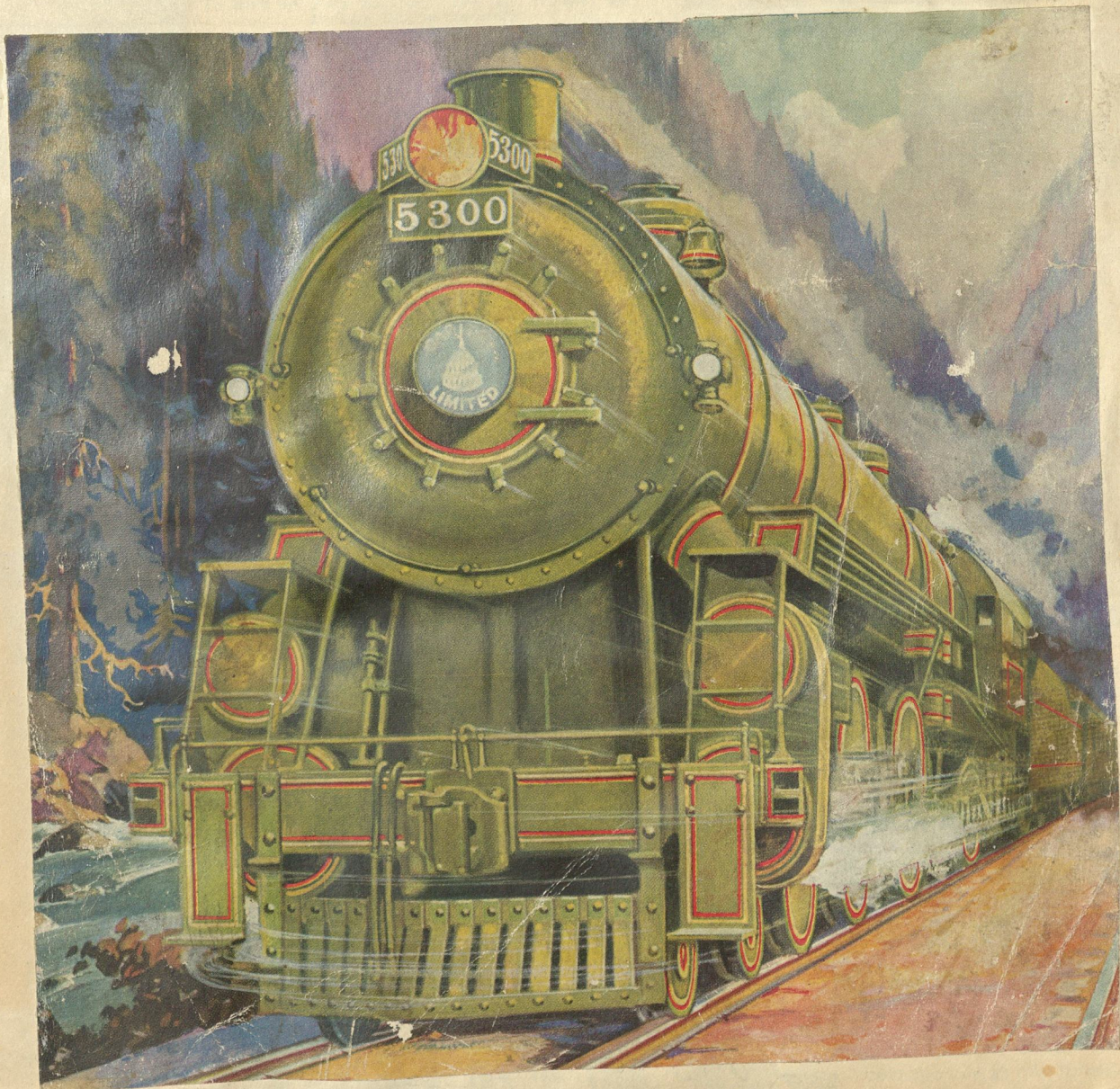
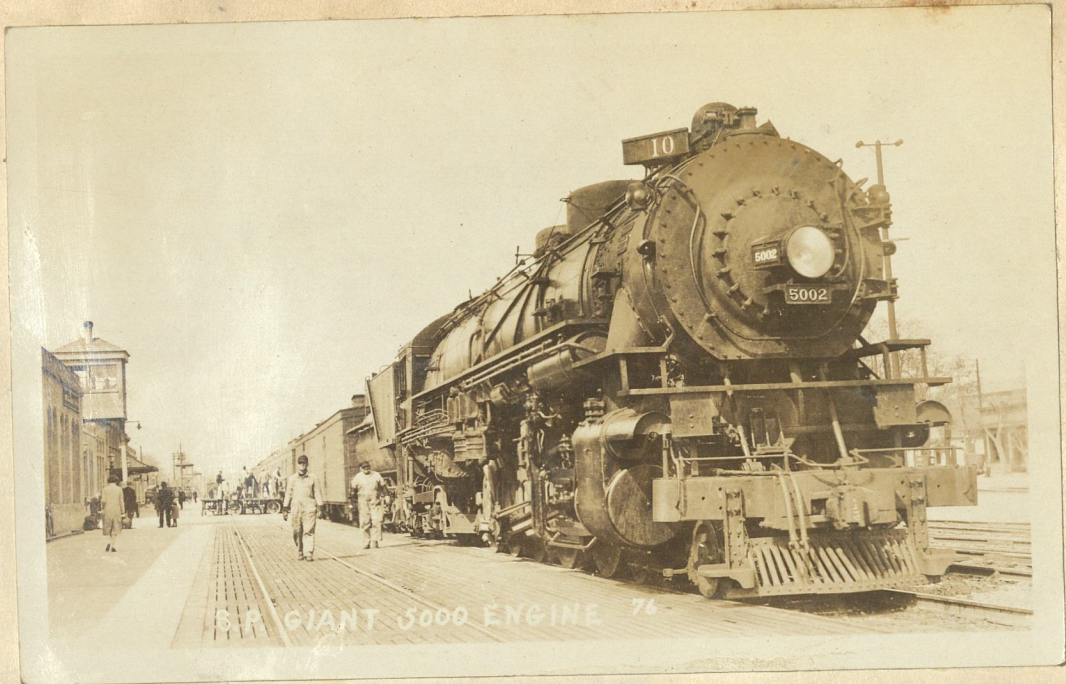
The famous 20th Century Limited,
New York to Chicago in 18 hours.



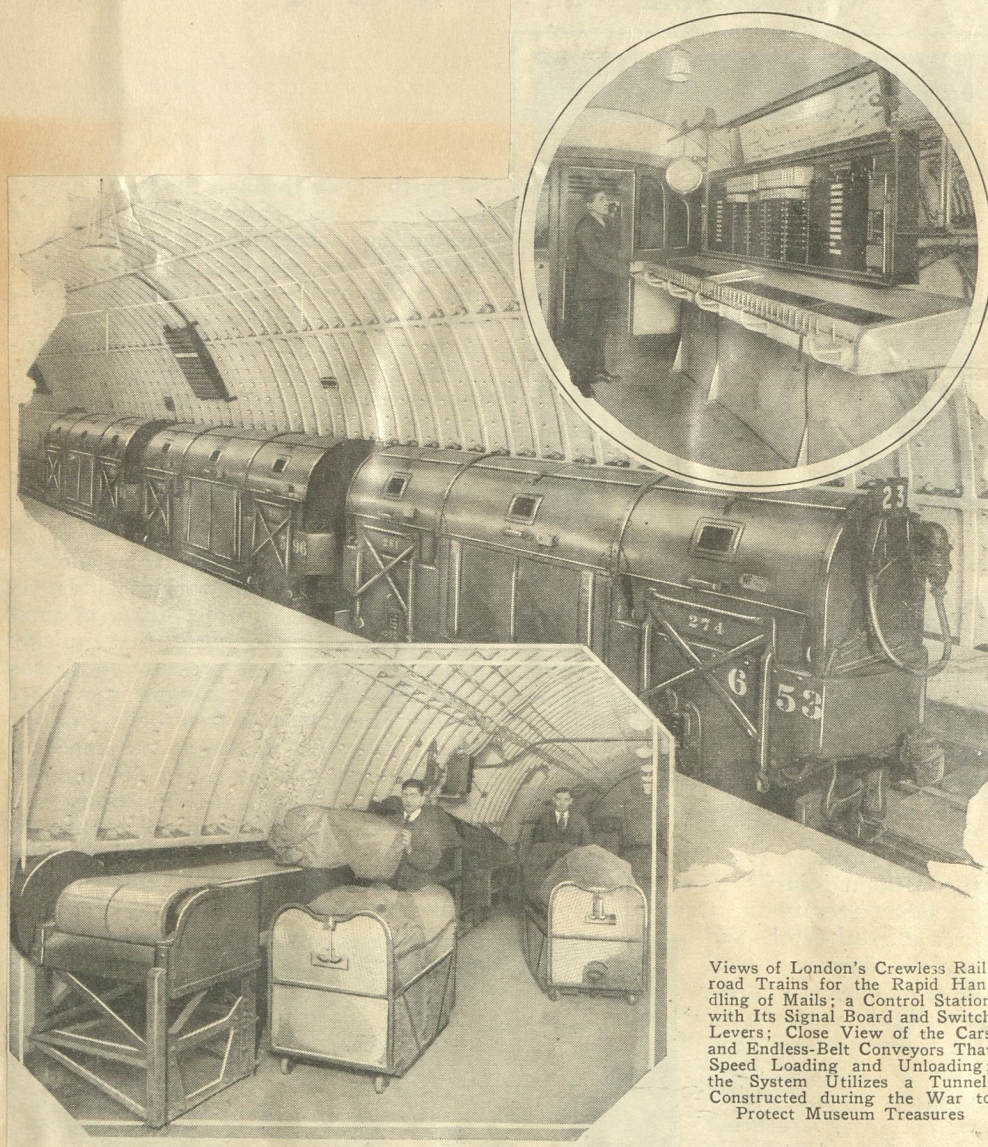
Electric Locomotive in Otira Tunnel Passing under
Forest of Icicles Caused by Winter Weather



The "Hanseatic Flyer," New 100-Mile an Hour Diesel-Electric Car of the German State Railways,
Leaving Berlin for Hamburg

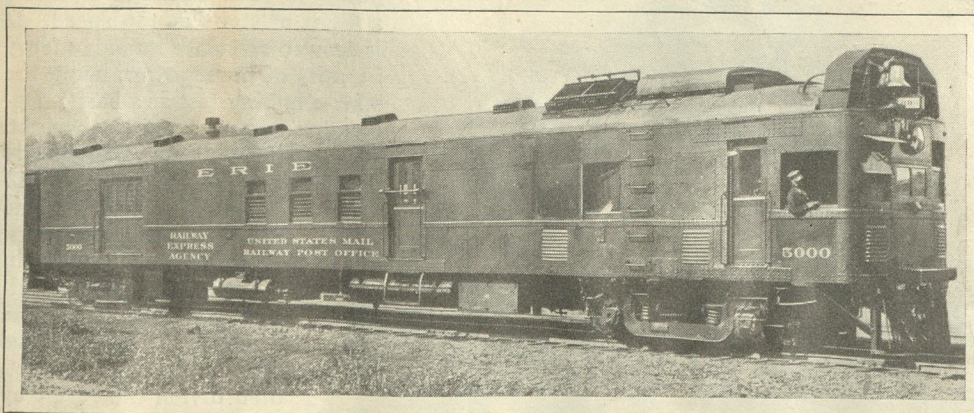


CREWLESS TRAINS SPEED MAIL IN LONDON TUNNEL



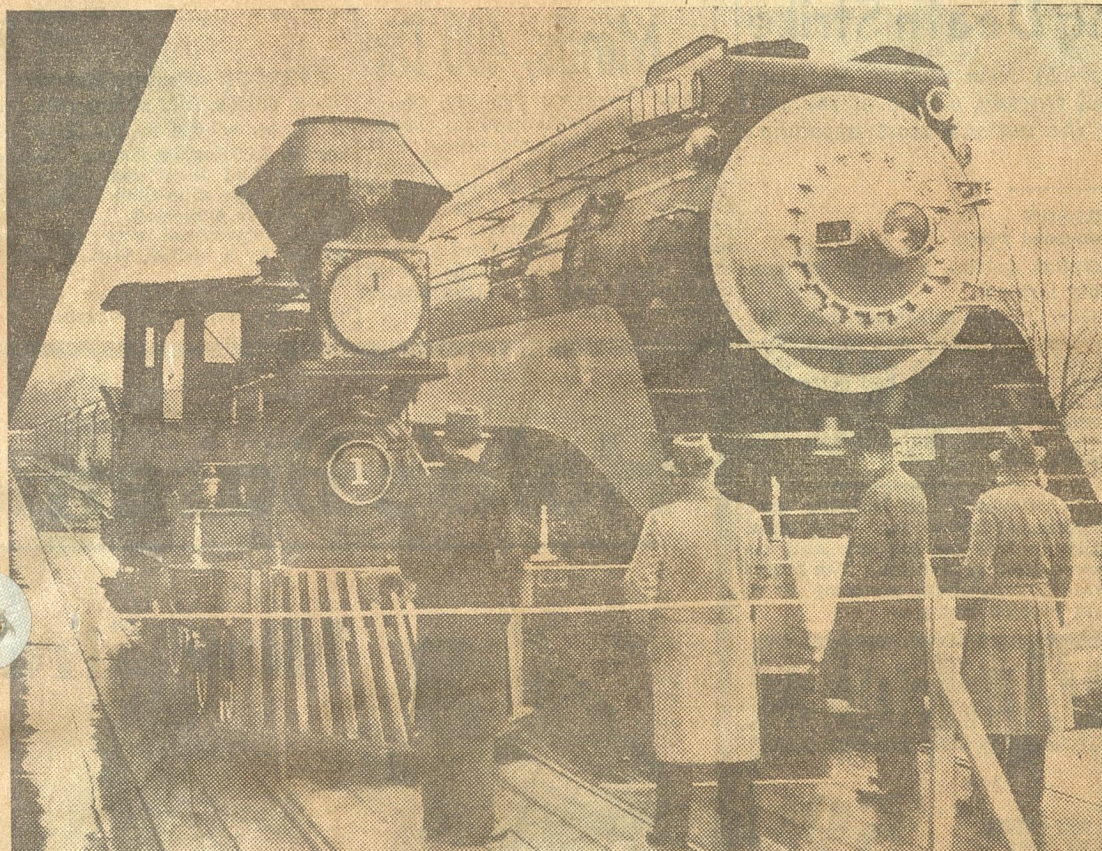
Views of London's Crewless Railroad Trains for the Rapid Handling of Mails; a Control Station with Its Signal Board and Switch Levers; Close View of the Cars and Endless-Belt Conveyors That Speed Loading and Unloading; the System Utilizes a Tunnel, Constructed during the War to Protect Museum Treasures

FIRST OIL-ELECTRIC RAIL CAR ATTAINS HIGH SPEED



Oil-Electric Railway Car Which Operates under Its Own Power Supplied by Motors and Generators in Forward Compartment; It Can Travel at Eighty-Five Miles an Hour

New Marvel Compared To Old



The newest and the oldest in western railroad transportation are pictured above. They are the Carlos P. Huntington, one of the first engines to operate in the West, and the new Southern Pacific streamlined Daylight which

will cut the running time between San Francisco and Los Angeles to nine hours and forty-five minutes. The new streamliner will be on exhibition until 6 P. M. today at the Southern Pacific station. *Bee Photo*

Streamliner Is Inspected Here

The Southern Pacific's new \$1,000,000 streamline train The Daylight, is a visitor in Sacramento.

The sleek, vivid colored engine and its dozen ultra-comfortable cars which will race between San Francisco and Los Angeles in 9 hours and 45 minutes are the railroad's answer to the traveling public's demand for speed and comfort in transportation.

Hundreds of visitors thronged through the train at the Southern Pacific depot starting at 9:30 o'clock this morning.

Train Is Modern

They saw a train equipped with every modern convenience from radio to air conditioning.

The Daylight's chair cars are in varying warm color schemes. The swivel chairs are padded with a soft sponge rubber composition. Windows throughout the train are unusually wide and give passengers a virtually unobstructed view.

For those who like a cocktail or a highball there is a modernistically designed tavern car with comfortable lounges and a circular bar.

The train carries both a coffee shop and a diner.

Two Cars Showplaces

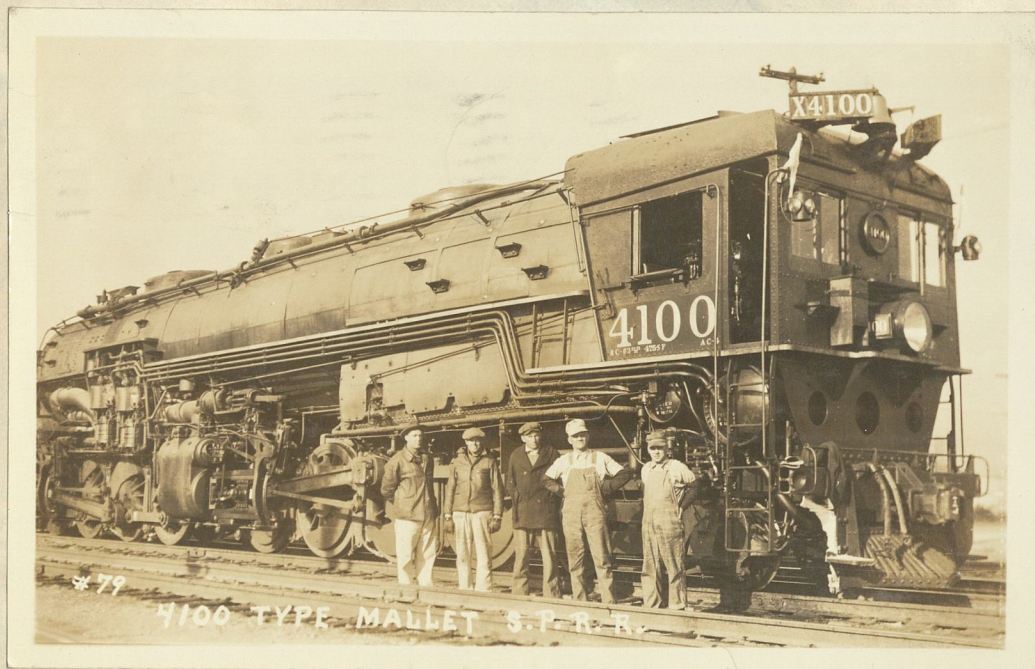
The showplaces of the Daylight are the parlor and observation cars, furnished with jade and rust-colored chairs and lounges.

The observation section ends the train in a smooth, windowed curve, lined with movable chairs and settee.

Service Starts Sunday

C. E. Spear, the district agent for the company, announced the train will go into service Sunday. It will leave San Francisco at 8:15 A. M. and arrive in Los Angeles at 6 P. M. The same schedule will operate on the northbound trip.

The train was scheduled to leave Sacramento for San Francisco at 7 P. M. tonight. A group of specially invited Sacramentans will make the trip, returning here on an east-bound train at midnight.



#79
4100 TYPE MALLET S.P.R.R.



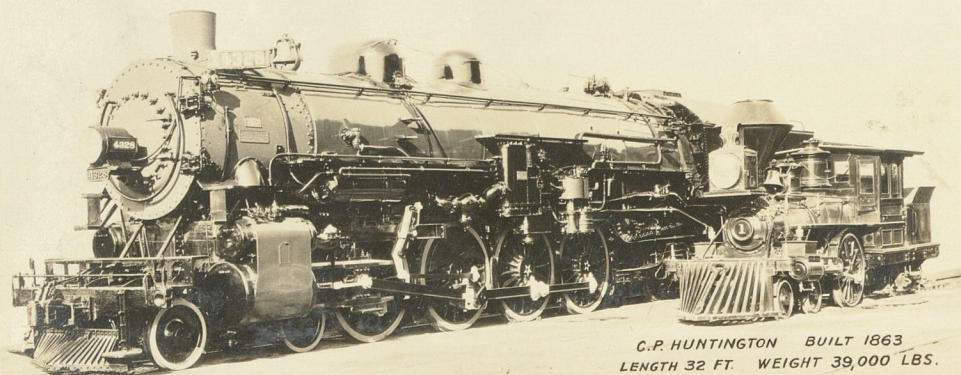
"City of San Francisco"
Southern Pacific Co.'s
new Streamline
train.

SP 201



SOUTHERN PACIFIC COMPANY
MALLET TYPE LOCOMOTIVE NO. 4126
120 FT. 10 1/2 IN. LONG
931,600 LBS. TOTAL WEIGHT

SP 180



C.P. HUNTINGTON BUILT 1863
LENGTH 32 FT. WEIGHT 39,000 LBS.

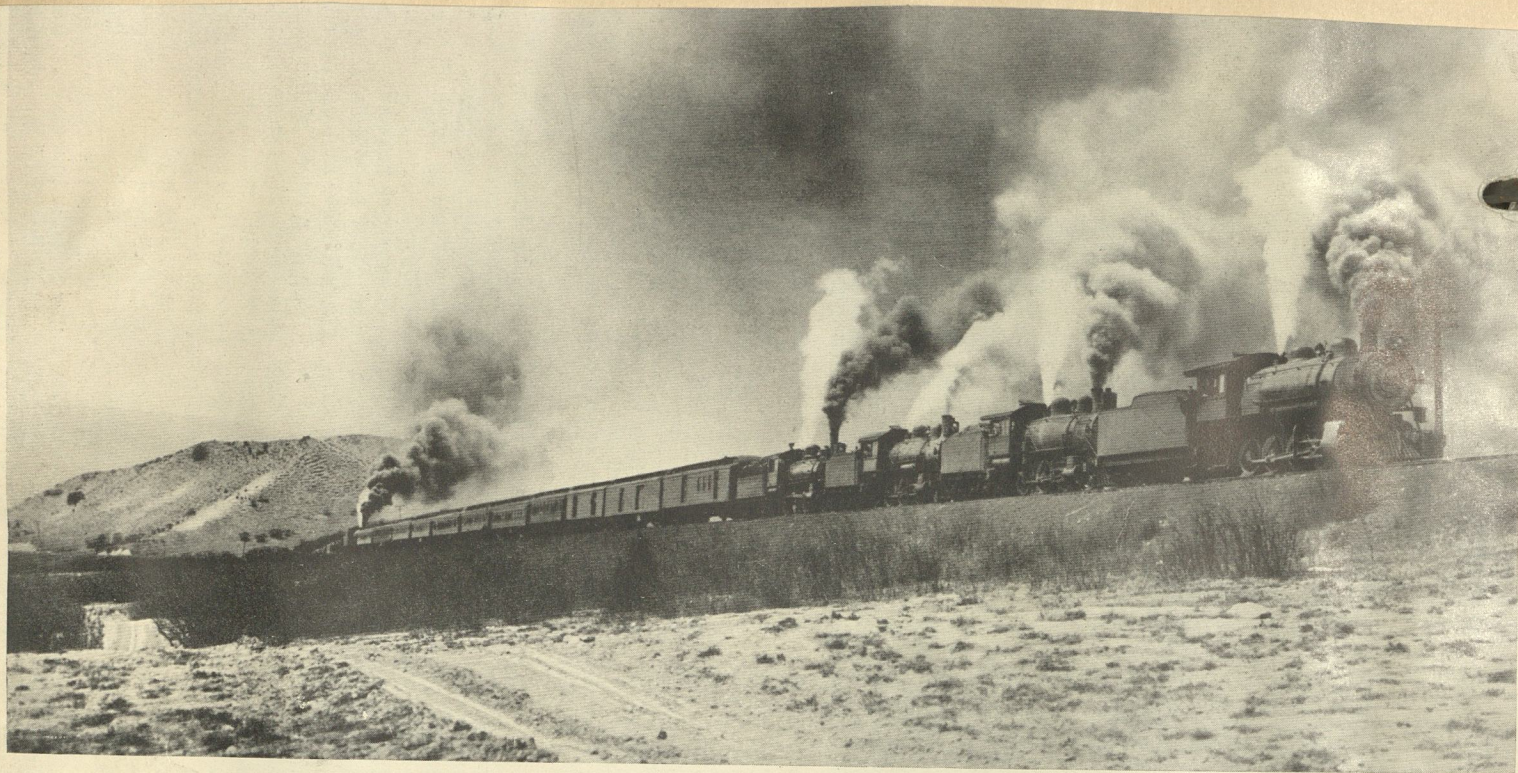
MODERN TYPE LOCOMOTIVE NO. 4328
BUILT BY SOUTHERN PACIFIC COMPANY 1930
LENGTH 97 FT. OVER ALL WEIGHT 368,000 LBS.

S.P. 86



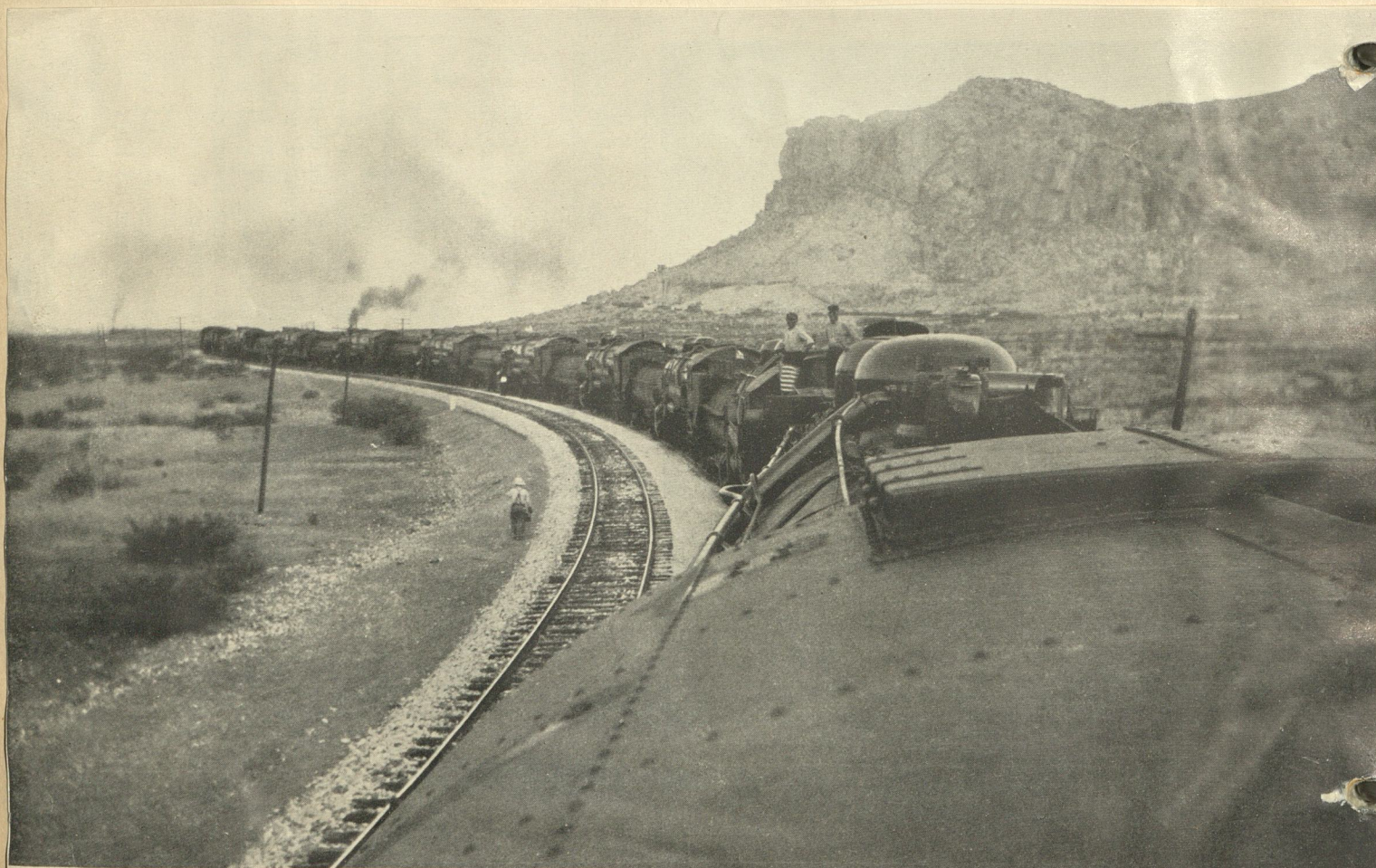
"C.P. HUNTINGTON"
Southern Pacific R.R. of California No. 1 - Original Central Pacific No. 3
Cylinders 11" x 15" Diam. of Drivers 54"
Weight on Drivers 18,500 lbs. - Weight on Trucks 20,500 lbs. - Total weight 39,000 lbs.
Built by Danforth, Cooke & Co. Patterson, N.J. - Shipped around the Horn on the sailing vessel
"Success" - Went into service on the Central Pacific R.R. at Sacramento, April, 1864

S.P. 186



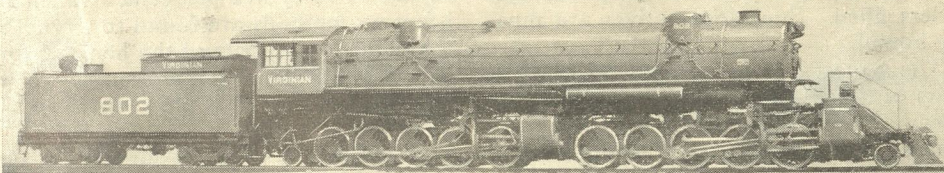
CLIMBING THE ROCKY MOUNTAINS

The Denver and Rio Grande Railroad crosses the Rockies over three passes, each more than 10,000 feet high. At Ibex Station it reaches 11,522 feet. This is half a mile higher than the highest automobile road in Europe and nearly two-thirds of a mile higher than the Hospice of St. Bernard, the highest habitation in Europe. Five engines are required to move the "Denver Limited" up the Soldiers Summit grade, and even they have a hard struggle when the tracks are wet or greasy.

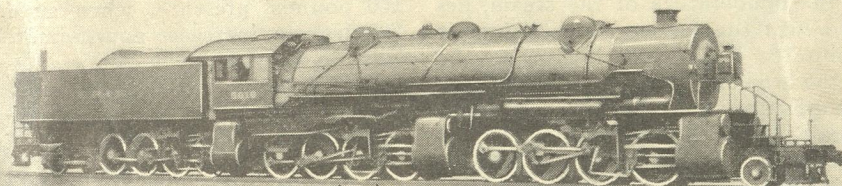


THE PROSPERITY SPECIAL AT STEIN'S PASS, NEW MEXICO

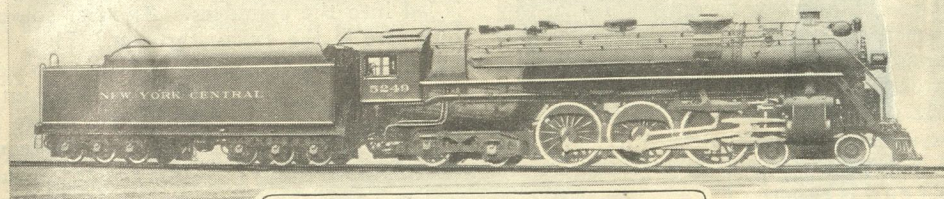
Last summer the Baldwin Locomotive Works delivered to the Southern Pacific a large order of massive locomotives. Taken as a special, no other train that ever crossed the continent attracted as much attention as this.



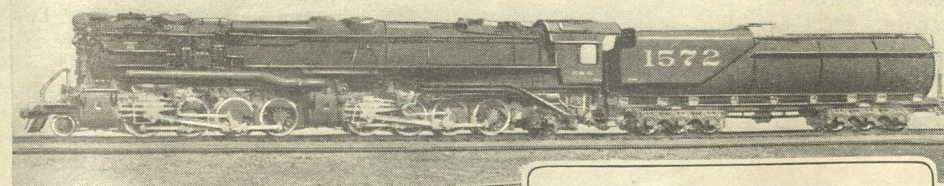
A Giant 2-10-10-2 Whose Four Cylinders and Twenty Drivewheels Pull Coal Trains over the Mountains



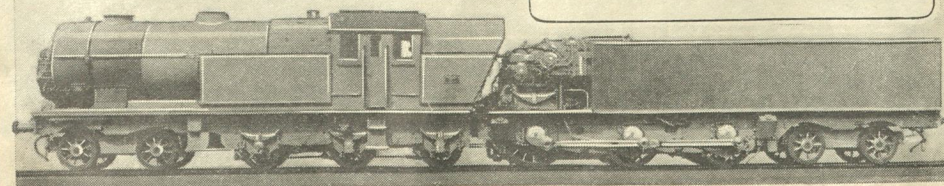
Here Another Pair of Cylinders Has Been Added to Operate Drivewheels beneath the Tender



The Size of the Driving Wheels Stamps This N. Y. C. Hudson Type as a Fast and Heavy Passenger Engine



High-Pressure Articulated Locomotive, Above, and, Below, a New British Turbine Engine Which Has Boiler Only in the First Unit and Carries the Driving Mechanism on the Tender; It Is Used in Express Service



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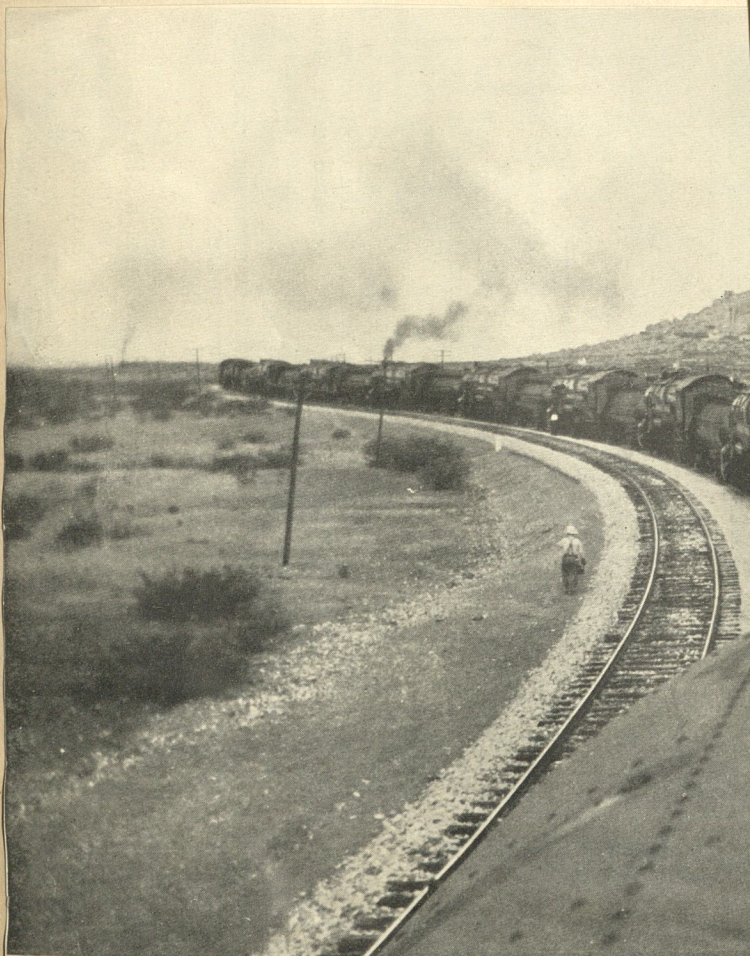
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CLIMBING THE

The Denver and Rio Grande Railroad crosses the Rockies over three feet. This is half a mile higher than the highest automobile road in Europe, the highest habitation in Europe. Five engines are required to move the "I" struggle when the tracks are wet or greasy.



THE PROSPERITY SPECIAL AT STEIN'S PASS, NEW MEXICO

Last summer the Baldwin Locomotive Works delivered to the Southern Pacific a large order of massive locomotives. Taken as a special, no other train that ever crossed the continent attracted as much attention as this.

Raising the Iron Horse



Fitting a Red-Hot Rim, Heated to Expand It, over a Locomotive Drivewheel; Cooling and Contraction Assure a Tight Fit

small-factory power plants, to a modern 2-10-4 locomotive complete with superheater and booster, is a long step, but Baldwin took it by easy stages. His first locomotive was the original "colt" that grew up to be the "iron horse" in America, for it was a baby-sized affair. The proprietor of the Philadelphia museum dropped in one day to tell Baldwin that Philadelphians were getting excited over reports of the success of steam trains in England. He suggested that a miniature train would draw crowds to the museum, and asked Baldwin to build the outfit.

With nothing but brief descriptions and crude sketches of Stephenson's "Rocket" and other Eng-

lish locomotives to go by, Baldwin turned out his first locomotive, and in the last week of April, 1831, this first engine to bear his name made its trial trip, on a circular track of pine boards reinforced with hoop iron, in the museum building. The Lilliputian locomotive drew two small wooden cars, providing seats for a total of four passengers.

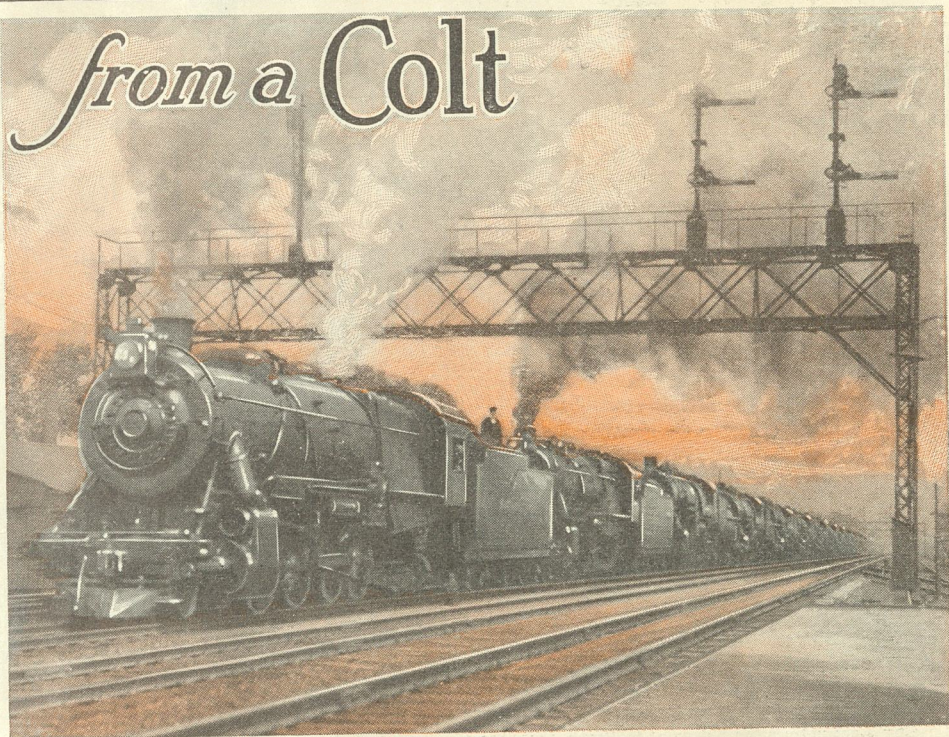
Anthracite coal and pine knots furnished the fuel, and when the first Baldwin steamed along the hoop-iron rails, crowds flocked from a large section of the Atlantic seaboard to see the marvel.

Since that time, Baldwin and his successors in the company that bears his name, have built more than 60,000 full-sized locomotives, including many of the latest marvels of the rails, but none, probably, will ever be the mechanical rival of his first big job, the immediate successor of the museum engine.

From the building of low-pressure,

of the museum engine.

from a Colt



A Train of Locomotives, Hauled by Two of Their Number under Steam, Starting across the Country for Delivery to a Western Railroad; the Engines Are Destined for Freight Service

The success of the museum demonstration brought an order from the Philadelphia, Georgetown and Norristown railroad company—a pioneer whose impressive name was only slightly shorter than its six miles of track—for a steam engine to replace the horses that then pulled the coaches over the rails.

An English locomotive had just been imported by another road, and Baldwin obtained an opportunity to inspect the parts before they were assembled. On the strength of that brief inspection, plus his previous experience building the small model, he turned out "Old Ironsides," the yearling of the future "iron-horse brigade."

There were practically no tools in America suitable for engine building, and very few competent workmen. These few were blacksmiths, whose training did not extend much past the ability to weld an inch-square bar. Baldwin bored his first cylinders with a tool of his own design—a chisel mounted in a block of wood and turned by hand.

Despite the handicaps, a few days before Thanksgiving, seven months after the trial trip of the museum model, "Old Ironsides" took to the rails and did twenty-eight miles an hour over the bumpy track of the P., G. & N. R. R. She was a four-wheeler, capable of pulling a thirty-ton load—a weight equal to about three-fourths the load of a modern average-sized coal car.

"This," said Baldwin, as he delivered the job to the railroad heads, "is our last locomotive."

Time, though, healed the scars of wrestling with that creative problem, and the lure of steam soon had him back in the fold. Just nine years later, he established a record by exporting the first locomotive shipped from the United States. Austria was the original purchaser and the export business, started then, has since grown to enormous proportions, for American locomotives are found all over the world.

The iron horse has changed remarkably since his colt days. The youngster didn't have a cab for the crew, he didn't have air

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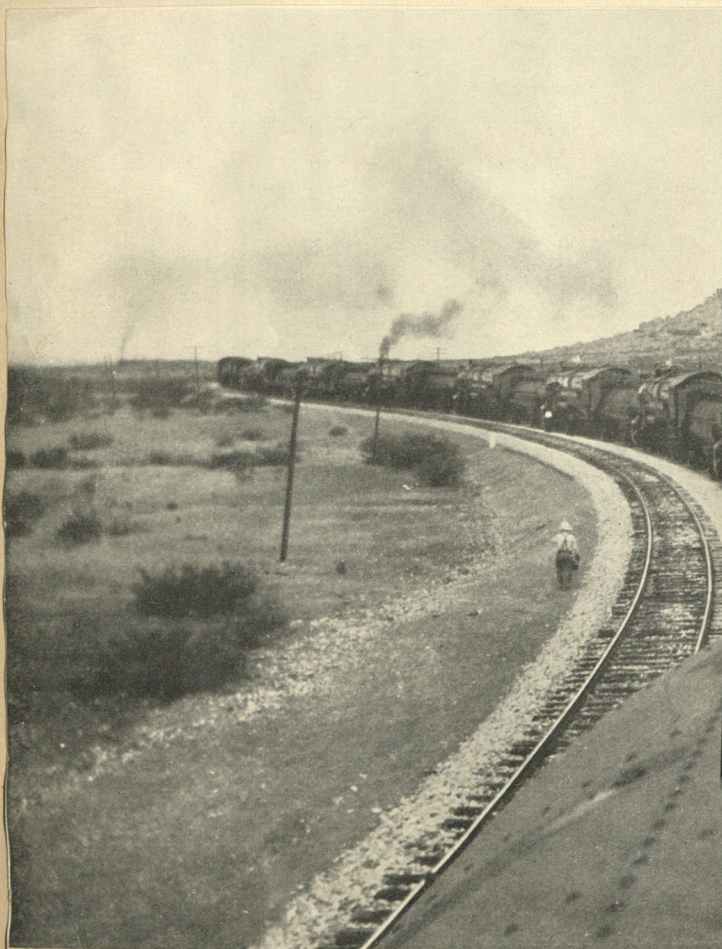
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CLIMBING THE

The Denver and Rio Grande Railroad crosses the Rockies over three feet. This is half a mile higher than the highest automobile road in Europe. Five engines are required to move the "struggle" when the tracks are wet or greasy.



THE PROSPERITY SPECIAL AT STEIN'S PASS, NEW MEXICO

Last summer the Baldwin Locomotive Works delivered to the Southern Pacific a large order of massive locomotives. Taken as a special, no other train that ever crossed the continent attracted as much attention as this.

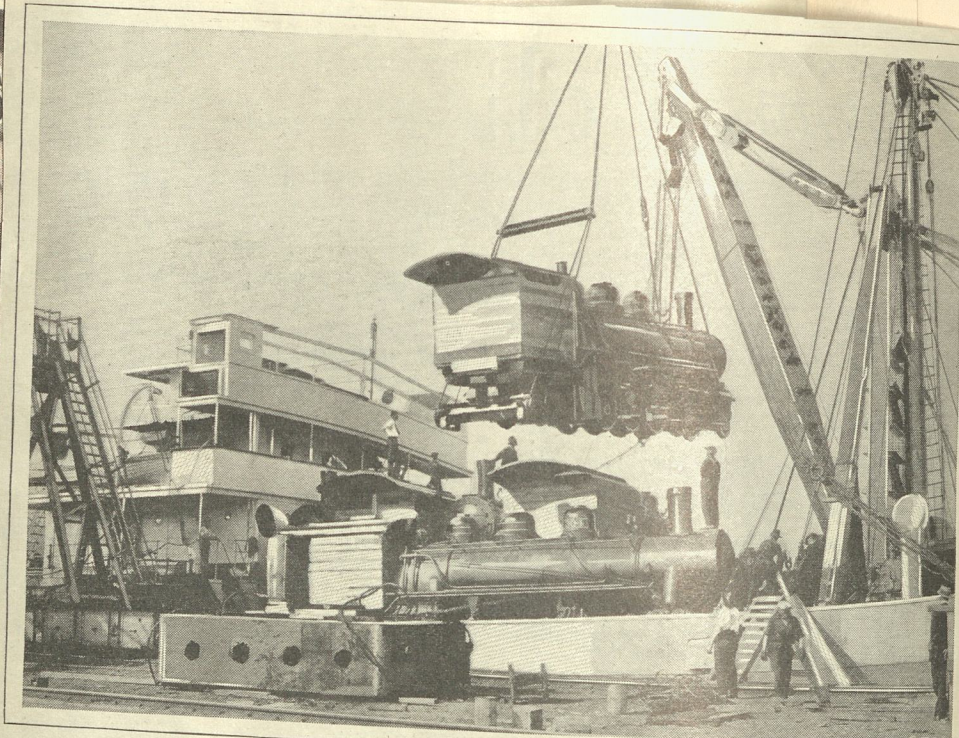
Rails



Fitting a Red-Hot Ri
Cool

BACK in the dusty was couraged jeweler trade, form machinist—and locomotive facto

Matthias Ba David Mason, t out to make rail kind of engine bookbinders' m the calico print ton mills. The tionary vertical sity, for they their new facto vent one than such a success came the major which soon na when Mason d From the



Loading Locomotives for Shipment to South America; the Engines, with Cabs Boxed, Are Loaded Intact by Special Derricks, and After the Hold Is Filled, Others Are Lashed on Deck

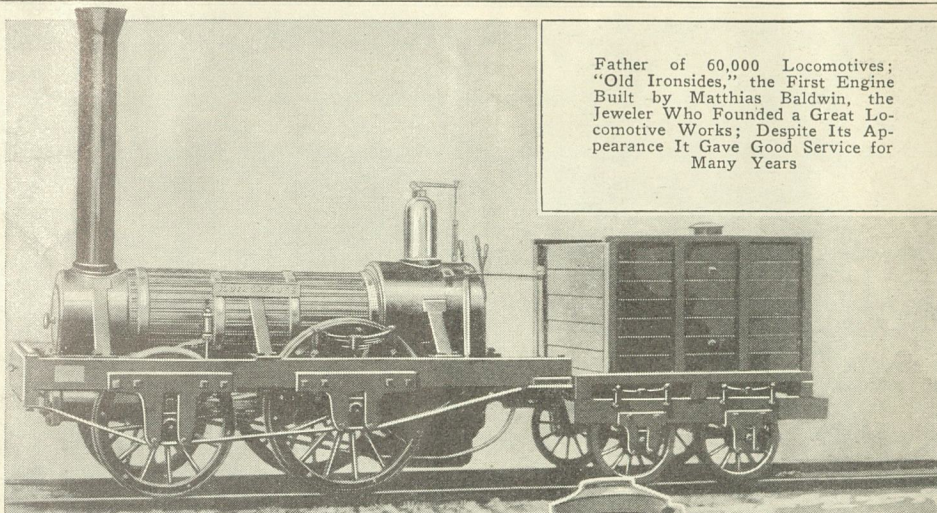
brakes to stop the train, he didn't have leading trucks or a pilot to put them under, and didn't have enough fire box to require trailing trucks, as the little wheels that follow the big drivers are called. His tender was a wooden box on wheels. He didn't have a bell or a whistle, a sand dome, a superheater, a flock of recording gauges, or any of the hundred and one gadgets that no locomotive engineer nowadays could do without.

The early engineer, as he appears in the old prints, was a stately figure standing out in the open, under—if it was a formal occasion—the sheltering brim of a tall and impressive beaver-fur top hat and even incased in a frock coat.

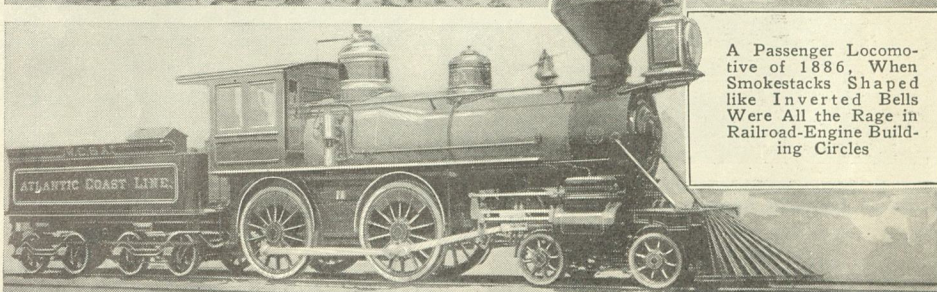
Compare that picture with the modern engineer, sitting at ease, probably on a well-upholstered seat, on the right-hand side of the engine cab. In front of and around him is a multitude of gauges, levers, knobs, wheels and other devices. He even rings the bell nowadays with a small steam engine, instead of pulling a lanyard, as in the past.

Within easy reach is the throttle lever extending from the back head of the boiler. Just in front of him are two small levers which control the independent and train air-brake valves, and at his left side the long reverse lever sticks up through the floor. On some of the late models, a screw or power gear replaces the big reverse lever. The back head of the boiler is covered with recording instruments, under a shaded electric light. Steam gauges indicate the boiler pressure and steam-heat pipe pressure, and the water column shows the water level in the boiler. An electric pyrometer may be mounted to show the temperature of the steam entering the cylinders. Close to the brake valves are two gauges to tell the condition of the air-brake equipment. A host of small levers and valves control the water injectors, sander valve, bell ringer, whistle, headlight generator, stoker, steam to the train-heating line, and many other things.

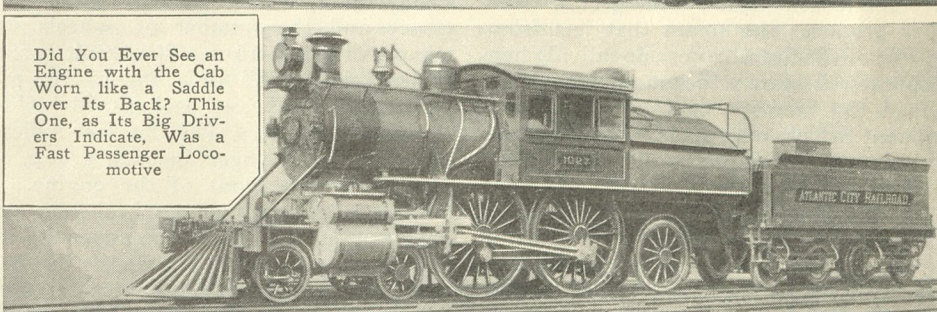
There is one valve that produces the cloud of steam that spurts from the cylinders just before the engine starts. That



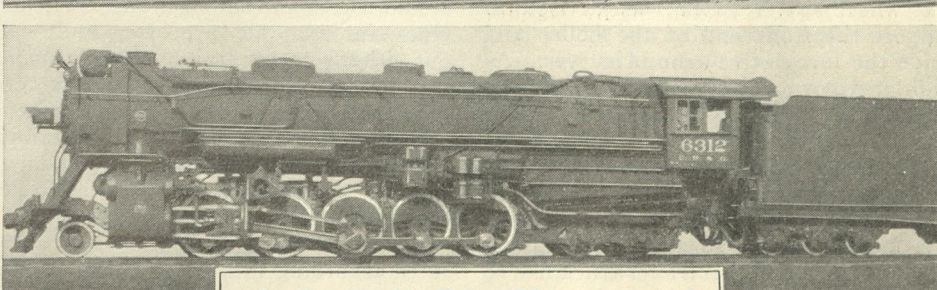
Father of 60,000 Locomotives; "Old Ironsides," the First Engine Built by Matthias Baldwin, the Jeweler Who Founded a Great Locomotive Works; Despite Its Appearance It Gave Good Service for Many Years



A Passenger Locomotive of 1886, When Smokestacks Shaped like Inverted Bells Were All the Rage in Railroad-Engine Building Circles



Did You Ever See an Engine with the Cab Worn like a Saddle over Its Back? This One, as Its Big Drivers Indicate, Was a Fast Passenger Locomotive



The Last Word in Modern Efficiency; a 2-10-4 Type (Count the Ten Driving Wheels) Built to Haul Heavy Coal Trains



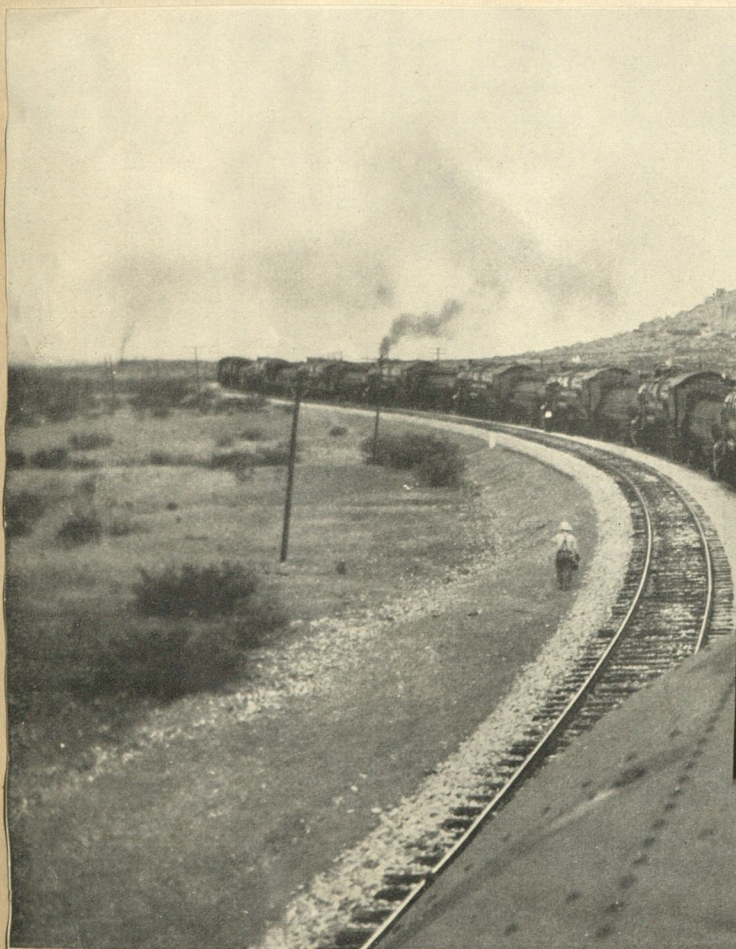
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CLIMBING THE R

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THE PROSPERITY SPECIAL AT STEIN'S PASS, NEW MEXICO

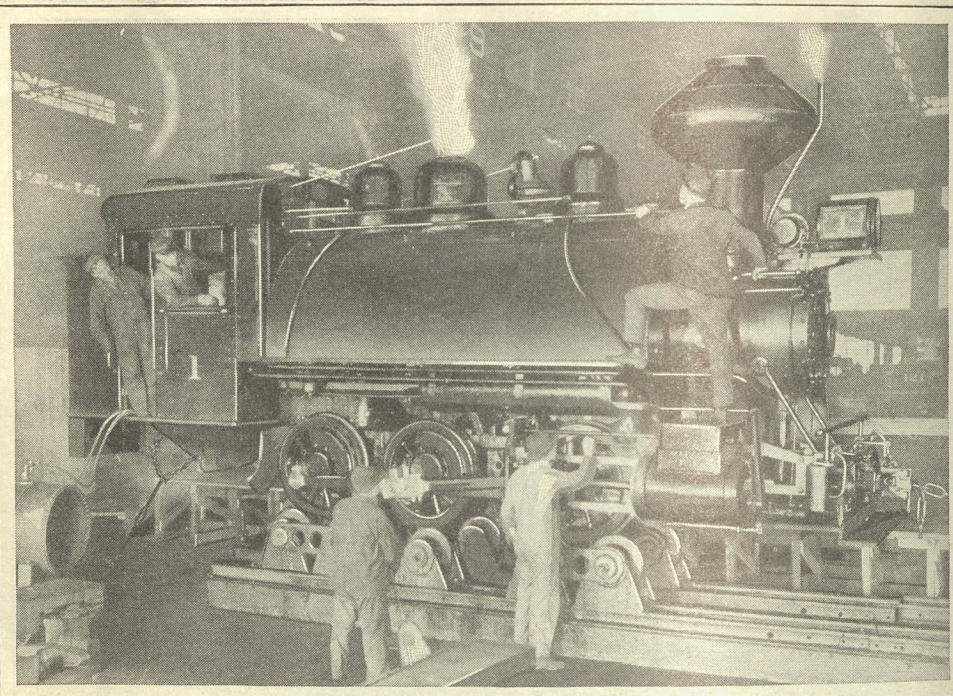
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Rais



Fitting a Red-Hot Ri
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BACK in the industry was a courageous jeweler trade, former machinist—and locomotive factory. Matthias Ba David Mason, the old pr out to make rail kind of engine bookbinders' m the calico print ton mills. The tionary vertical sity, for they their new facto vent one than such a success came the maj which soon na when Mason d From the



Giving an Industrial Locomotive a "Road Test" on a Roller Track; Moving Parts Are Worn In and All Tests Made in the Shop by This Clever Arrangement

is done to blow out any water which may have condensed while standing still. Another produces the steam that jets from the side of the fire box occasionally. When it appears, it shows the enginemen have opened the blowout cocks to eject any sediment which may have settled at the bottom of the fire-box shell—the lowest point on the boiler.

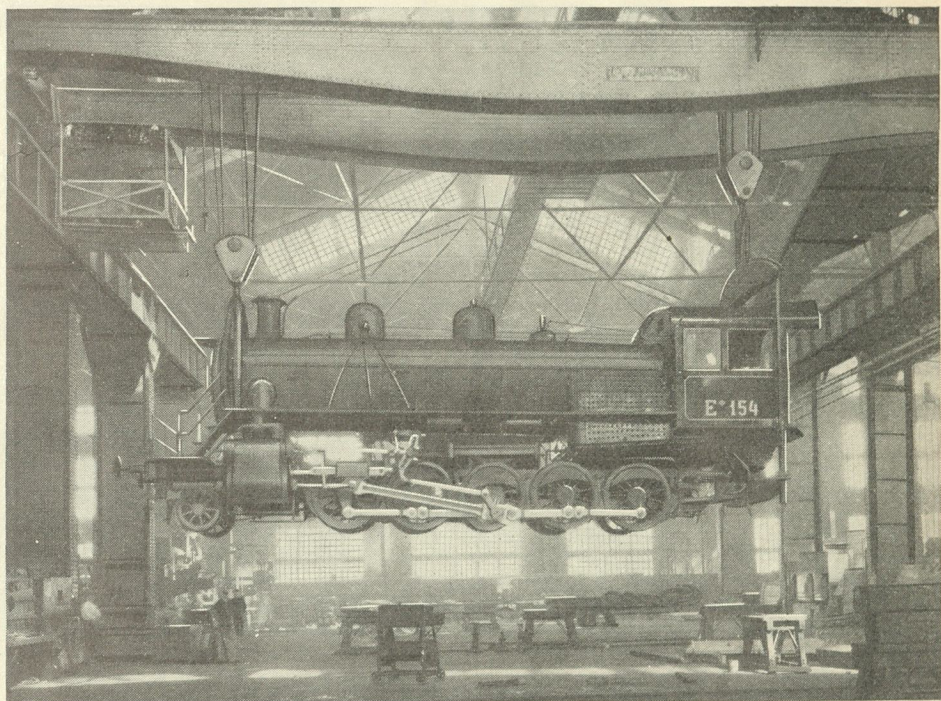
The first locomotives, like "Old Ironsides," had all their weight on four driving wheels, but as their size increased, to cope with bigger and heavier trains, the four-wheel swivel truck was devised to support the front end of the boiler and guide the locomotive around curves. As additional power was needed more driving wheels were added, and to make room for them, a single pair of pilot wheels sometimes replaced the leading truck.

Higher speeds called for more steam, and to produce it, the fire box became bigger and bigger, so a pair of trailing wheels or a four-wheel trailer truck had to be stuck under that end of the locomotive to carry the added weight. Soon there were so many different kinds of engines,

each designed for a specific purpose, that some way of classifying them became necessary and the number of wheels was taken as the criterion. The result is such symbols as "4-6-2" for a Pacific-type passenger locomotive, or, perhaps, "0-4-0" for a switch engine. The figures indicate the number of wheels in each group, beginning at the front of the engine. A 4-6-2 type has four pilot wheels, six coupled driving wheels, three on each side, and two small wheels under the fire box. The presence of a naught indicates there are no wheels in that position. Switch engines, for example, are often built without either pilot or trailing wheels such as the 0-4-0 and 0-6-0 type, in order to concentrate the greatest possible weight on the driving wheels, to give the maximum tractive power. The more weight on the drivers, the more pressure exerted to keep them from slipping when starting.

Locomotives, by the way, are always rated according to tractive power, and not horsepower.

The capacity of the locomotive is really limited by its ability to start a train from



Rail Giants Require Cranes to Handle Them; This One Is a 2-10-0 Switch Locomotive, as the Concentration of Its Weight on Many Small Driving Wheels Indicates

a standstill, so drawbar pull or tractive power is the standard of measurement. The boiler pressure, and the bore and stroke of the cylinders, determine it. Once the train gets up a speed of five to ten miles an hour, tractive power drops rapidly, and continues to decline as the speed increases, while the horsepower keeps on increasing until the boiler reaches its limit in supplying steam.

Railroad men have a very convenient way of determining how fast an engine will go, known as the formula of diameter-speed. Roughly, the maximum speed of an engine, in miles per hour, is the same as the diameter (in inches) of the driving wheels in engines. In other words, a freight locomotive with sixty-inch drivers will make sixty miles an hour at top speed, and a passenger locomotive with seventy-two-inch drivewheels can do seventy-two miles an hour.

Weight plays an important part in measuring what a locomotive will do, for without sufficient weight on the drivers, the wheels will slip on the rails and the

formula of steam pressure, bore and stroke as a measure of tractive force ceases to work. In designing modern locomotives, the engineers plan to have approximately four times as much weight on the driving wheels as the tractive power needed. A Pacific-type passenger engine, to develop 40,000 pounds' pull at the drawbar, needs about 160,000 pounds on the drivers.

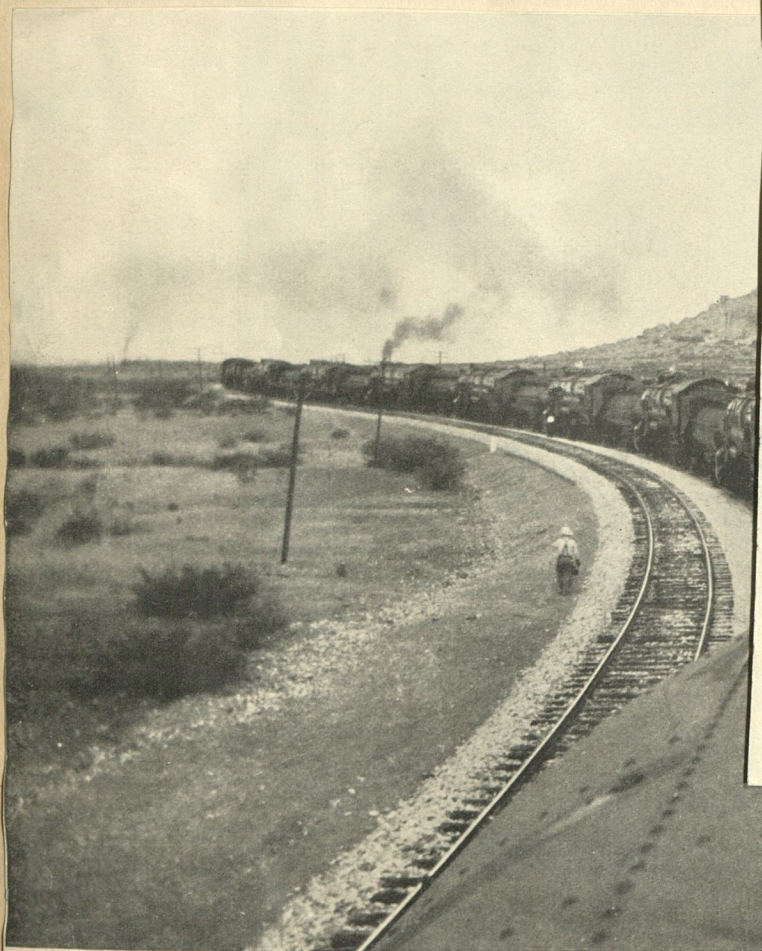
The bigger and better boilers and fire boxes of recent years have made it possible to add a third cylinder to heavy-duty mountain-type freight locomotives. The extra cylinder is mounted under the front of the boiler between the two cylinders of the conventional engine, and the front axle is forged with a crank, to which the piston rod is connected.

Another device to increase the starting power of freight engines is the booster, a small engine mounted under the tender and supplied with steam from the locomotive boiler. When a big train is to be started from a standstill, the booster is cut in and the engineer takes advantage of the tender's weight on its small-diameter



CLIMBING THE ROCKIES

The Denver and Rio Grande Railroad crosses the Rockies over three feet. This is half a mile higher than the highest automobile road in Europe, the highest habitation in Europe. Five engines are required to move the "Denver" struggle when the tracks are wet or greasy.



THE PROSPERITY SPECIAL AT STEIN'S PASS, NEW MEXICO

Last summer the Baldwin Locomotive Works delivered to the Southern Pacific a large order of massive locomotives. Taken as a special, no other train that ever crossed the continent attracted as much attention as this.

Rails

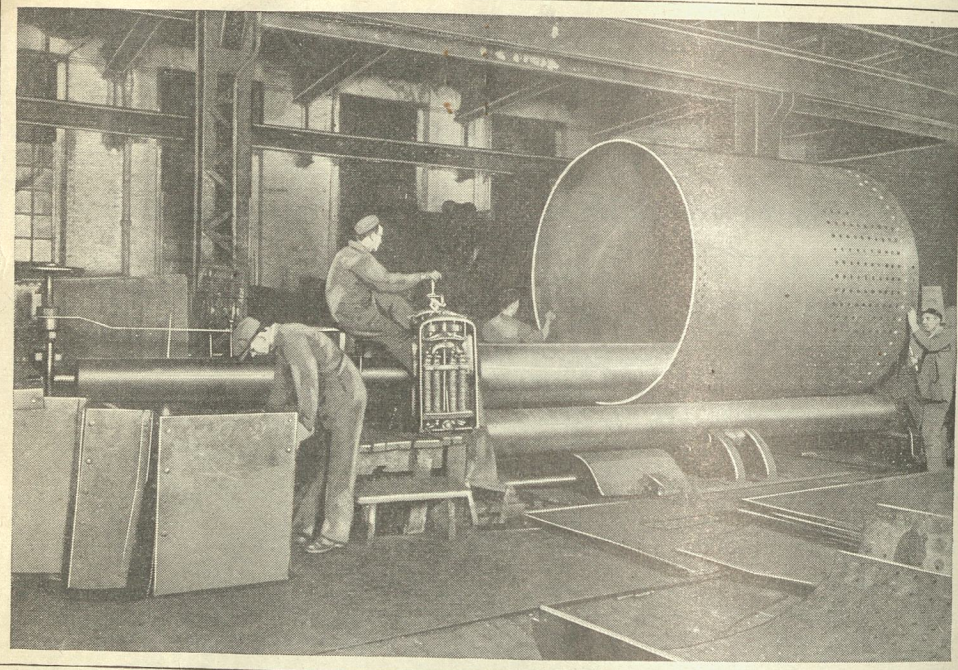


Fitting a Red-Hot Rail

BACK in the industry was discouraged jeweler trade, for the machinist—and the locomotive factory—Matthias Baldwin, David Mason, out to make rail out of kind of engine bookbinders' machine the calico print ton mills. The tionary vertical sity, for they their new factory vent one than such a success came the major which soon ne when Mason d From the

is done have co leading other p der, a the side requir it appe opened sedimen bottom point o The sides," ing wh cope w four-w support guide t addition wheels, a times r High and to bigger wheels be stuck to carry were so

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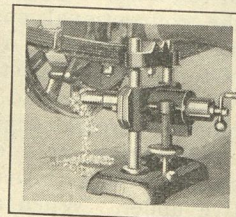


Heavy Steel Plates Are Bent, Drilled and Riveted by Mammoth Machines, in Contrast to the Painstaking Hand Labor Which Built Matthias Baldwin's First Engine Long Ago

wheels to develop considerably more pull. While locomotives are classified according to the number and arrangement of their wheels, certain general types have acquired a special name associated in some way with the use to which the first of that type were put. Thus a Pacific type follows the general lines of long-haul, fast passenger engines, first developed for the western ends of the transcontinental roads. The Mikado 2-8-2 type got its name from the fact that the initial order was for the Japanese Imperial railways'

AUTO BRAKE DRUMS REFACED WHILE STILL ON CAR

Without removing them from the car, the brake drums can be refaced and trued with a simple unit that is said to function to an accuracy of one-thousandth of an inch. It is placed under the axle like a jack, the cutting member



heavy-freight service. These two, with the six-wheel switcher class, are the most commonly used, but many others have been developed for special service. There are Mallets, named after the inventor, compound Mallets and compound engines in general, meaning locomotives which first use the steam in high-pressure cylinders and then use it again in low-pressure cylinders; big 2-10-4 engines, giants of the roads, and even articulated locomotives, so long that they have to be jointed to get around the curves.

adjusted, and the automobile's motor is used to rotate the brake drum. The weight of the car holds the unit rigid so that there is little likelihood of chatter.

REINDEER HERDED BY AIRPLANE TO SAVE TIME AND LABOR

On some of the big arctic stock farms, airplanes are being used to herd the reindeer, according to reports. In two hours, one man can accomplish as much as seven in a much longer time in locating the animals and driving them together.



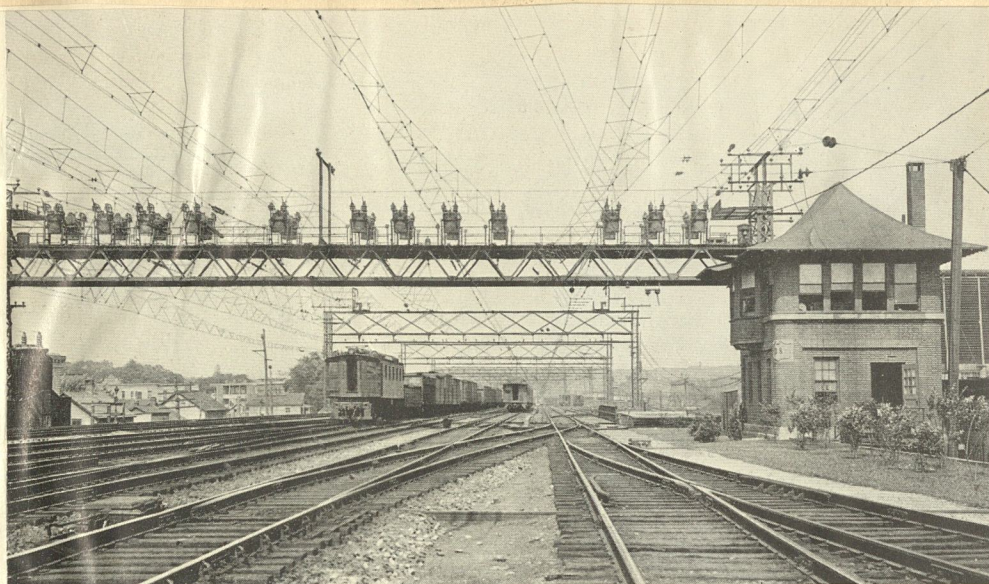
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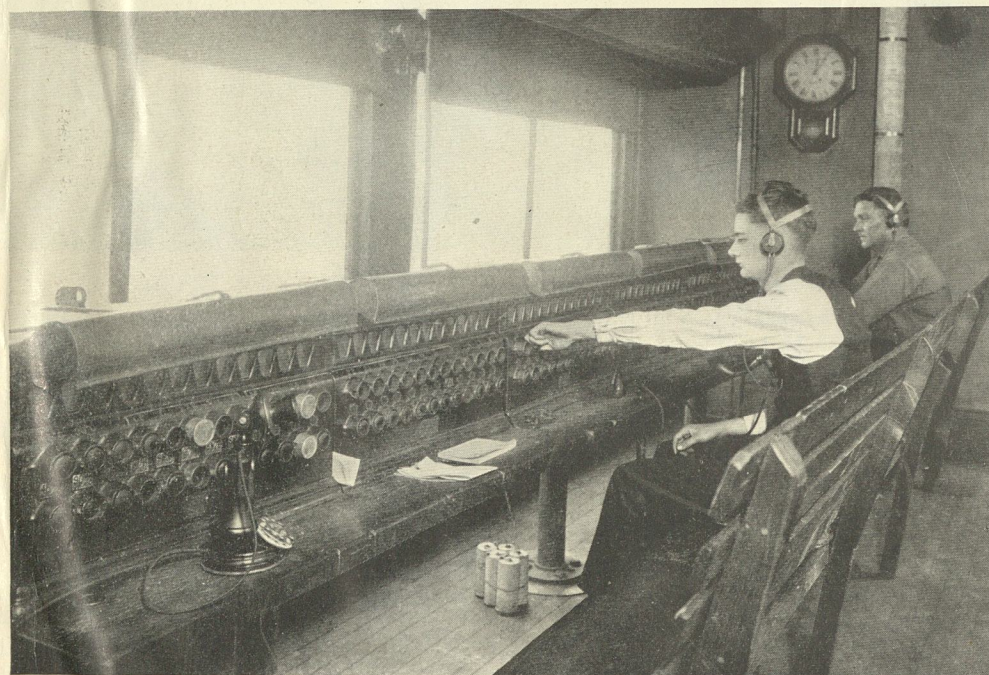
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A MODERN INTERLOCKING SIGNAL TOWER

The interlocking signal system has contributed no mean share to the reduction of the time of trains between terminals. If they had to thread the modern maze of tracks in the average city, with every switch hand-thrown and every signal hand-set, accidents and delays without number would occur.



THE MEN WHO CONTROL A MODERN CLASSIFICATION YARD

This push-button machine controls the maze of switches and tracks of the clearing yard near Chicago (see illustration, page 382).

Flying Down the Track into a Dumb, Dark World or across Sunny Plains, the Fear of Grade-Crossing Accidents Keeps Enginemen Always on the Alert

Coaling Pennsylvania Engines from an Eighty-Ton Capacity Electrically Filled Chute That Dumps on a Tender a Load of Four Tons in Two Minutes

Beside the White-Hot Blast That Leaps and Curls and Foams at the Crown Sheet, the Engineer of the Big, Racing Locomotive Keeps Ceaseless Vigil

From their Offices, Cool Dispatchers, by Orders Spoken through Selective Telephones, Keep Main-Line Traffic Moving on Their Divisions and Guide Trains Safely into Busy Terminals

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A Night Run with the Gotham Limited

How Nation's Fastest Trains Are Protected on Runs and Guided through Busy Terminals

SURROUNDED by loud-speaking telephones, telegraph instruments and electric lights, the train director in the interlocking tower is a commanding general who is in constant touch with every movement in the gigantic railway terminals developed to meet the constantly increasing demands of modern transportation. Before him is a long case, covered with frosted glass, on which is outlined the entire track and switch layout of the territory under his command. It is drawn to scale and little lights tell the condition of each track, whether it is occupied or vacant. Under his command are many men who manipulate the 400 levers that operate the switches and signals.

To put the average train onto its track in a big station requires the movement of from twenty to sixty levers. At one terminal there are 238 different points and crossings, 570 signals and 1,200 train movements on 113 tracks every railroad day. And yet the lever men handle this traffic without seeing the tracks or the trains on

them. "No. 54 ready," is the word that reaches the tower after the station gates have closed behind the last passenger.

"Put 'er on track twenty," the train director orders and, as the levers are set, the signals flash along the bewildering maze of tracks in the yard before the eyes of the engineer waiting with his hand on the throttle. The conductor swings aboard one of the coaches and pulls the signal cord twice.

Two short, singing squeaks of the little air whistle in the cab interrupt the pounding of the air pump, the engineer tugs gently on the throttle, the eighty-inch drivers move and the Gotham limited rolls forward on the first leg of its 908-mile journey from Chicago to New York.

As the train swings under the last of the terminal viaducts, the fireman catches the gleam from a lantern swung high over the head of a switchman and shouts across to the engineer:

"Highball," the railway code for a clear track in answer to an arm or lantern sig-



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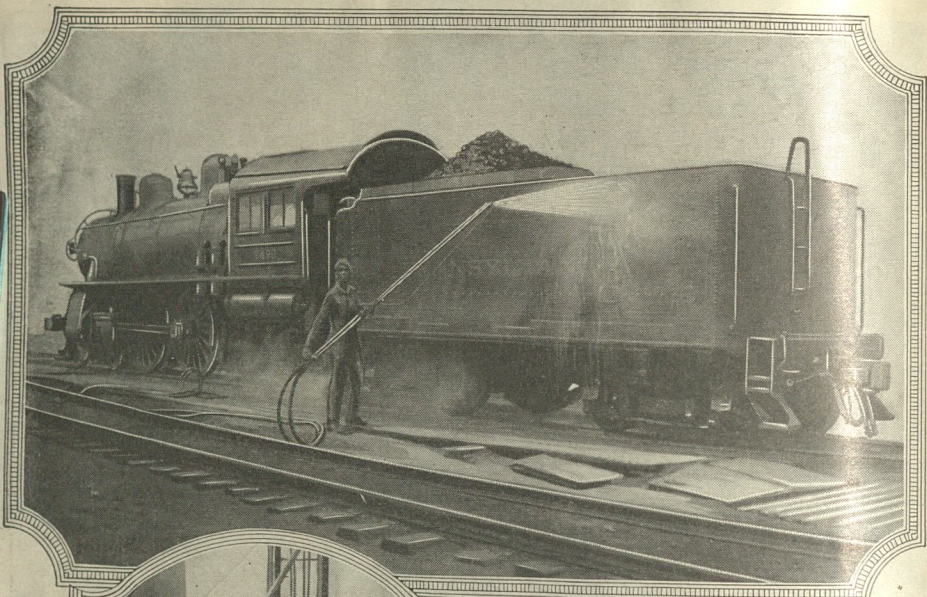
From Their Offices, Cool Dispatchers, by Orders Spoken through Selective Telephones, Keep Main-Line Traffic Moving on Their Divisions and Guide Trains Safely into Busy Terminals

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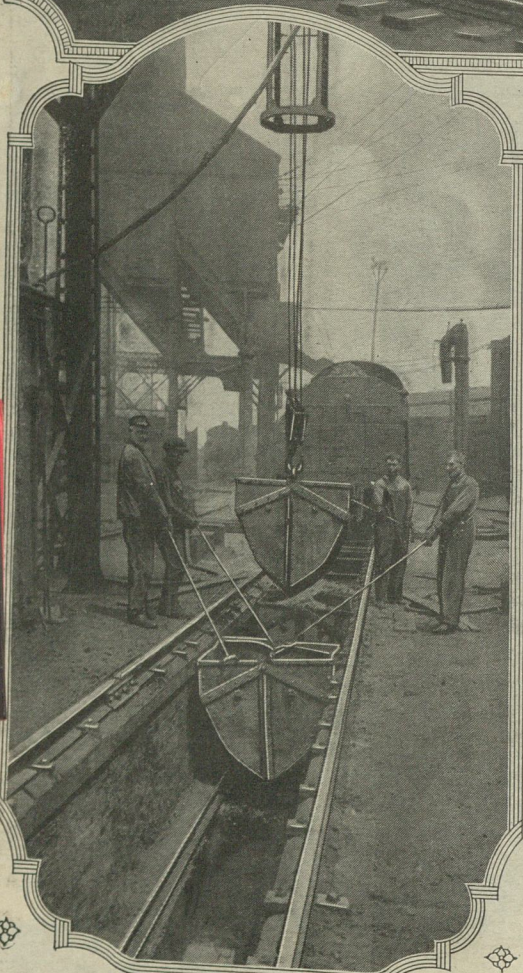
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Cleaning an Engine and Emptying Ash-Pit Boxes



nal, and Engine 5353's whistle answers with two short blasts. As the train picks up speed, the engineer, a keen-eyed, gray-haired, bulky figure of a man who, in different garb, might be taken for a banker or corporation head, spies a green light burning over a red one at the approach to a bridge.

"Clear block," he shouts to the fireman who echoes back the call as the train roars past the gloomy network of girders, flying down the track into a dumb, dark world.

Above, the stars are blotted out by a black ribbon of smoke. Behind, the bunched electrics in the coaches are blinking out. In the cab, the needles of the dials flicker to and fro, cinders rattle on the roof and the rails begin to hum as the 250-ton racing locomotive settles down to its work.

Every three miles or so the fireman takes his eyes from the track ahead long enough to tend his fire—a white-hot blast that leaps and curls under the crown sheet. It is a constant battle to keep the gauge between 190 and 205 pounds' pressure. To maintain an average speed of forty-five miles an hour requires from

seventy to eighty tons of fuel in the 900-mile run.

So that the flames will not scorch his hands, the fireman skillfully lets the edge of his shovel graze the bottom of the door, sending the coal evenly over the seething surface where the flames are fanned by a powerful blower. In front of the speeding

engine, the rails glisten in the glare of the 900,000-candlepower electric headlight, the beam of which cuts the darkness for 1,000 feet ahead and is visible for fifteen miles on a clear night.

The train is now running under the advance lighting system, which means that as it passes into each block the lights at the entrance of the one ahead flash out of the darkness. A "clear" signal shows that the track is open for at least two blocks ahead, giving the train two miles of unrestricted running. A caution signal is always set a mile ahead of a closed block so that only in case of an emergency is a train brought to a sudden stop.

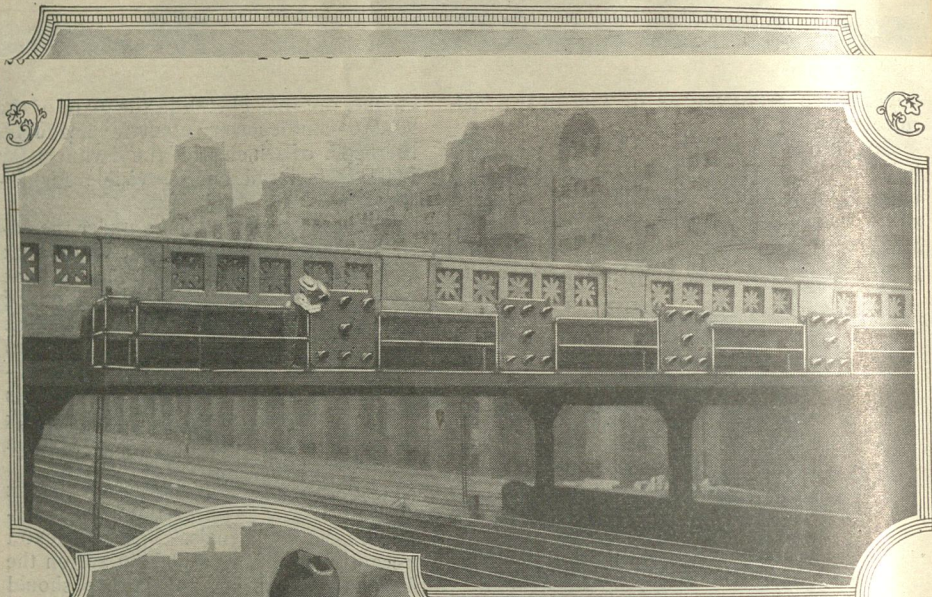
One of the Pennsylvania's stringent rules is that the engineer and fireman verbally repeat the signals. This is an extra precaution to insure that both are on the alert and to prevent any mishap should



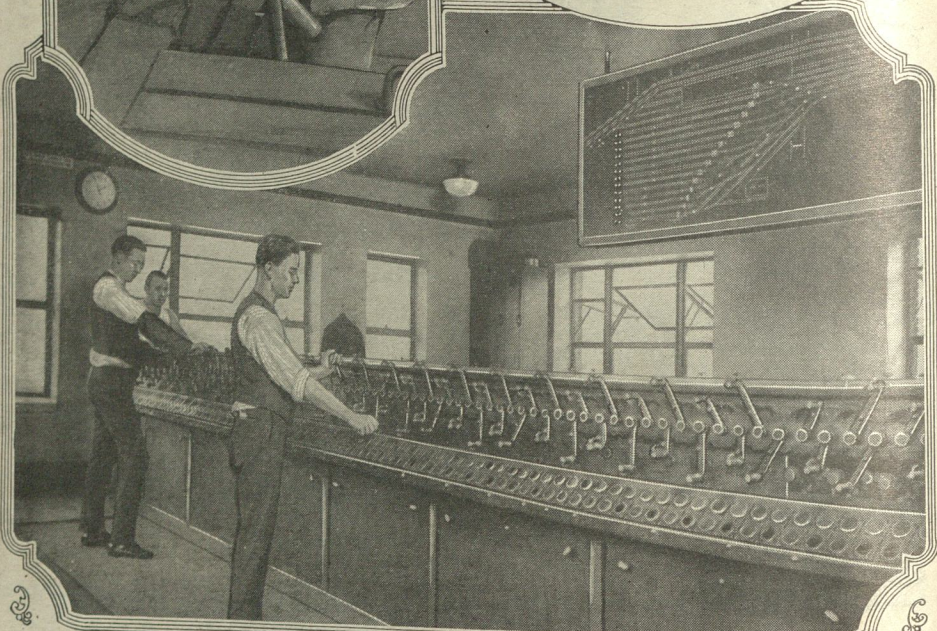
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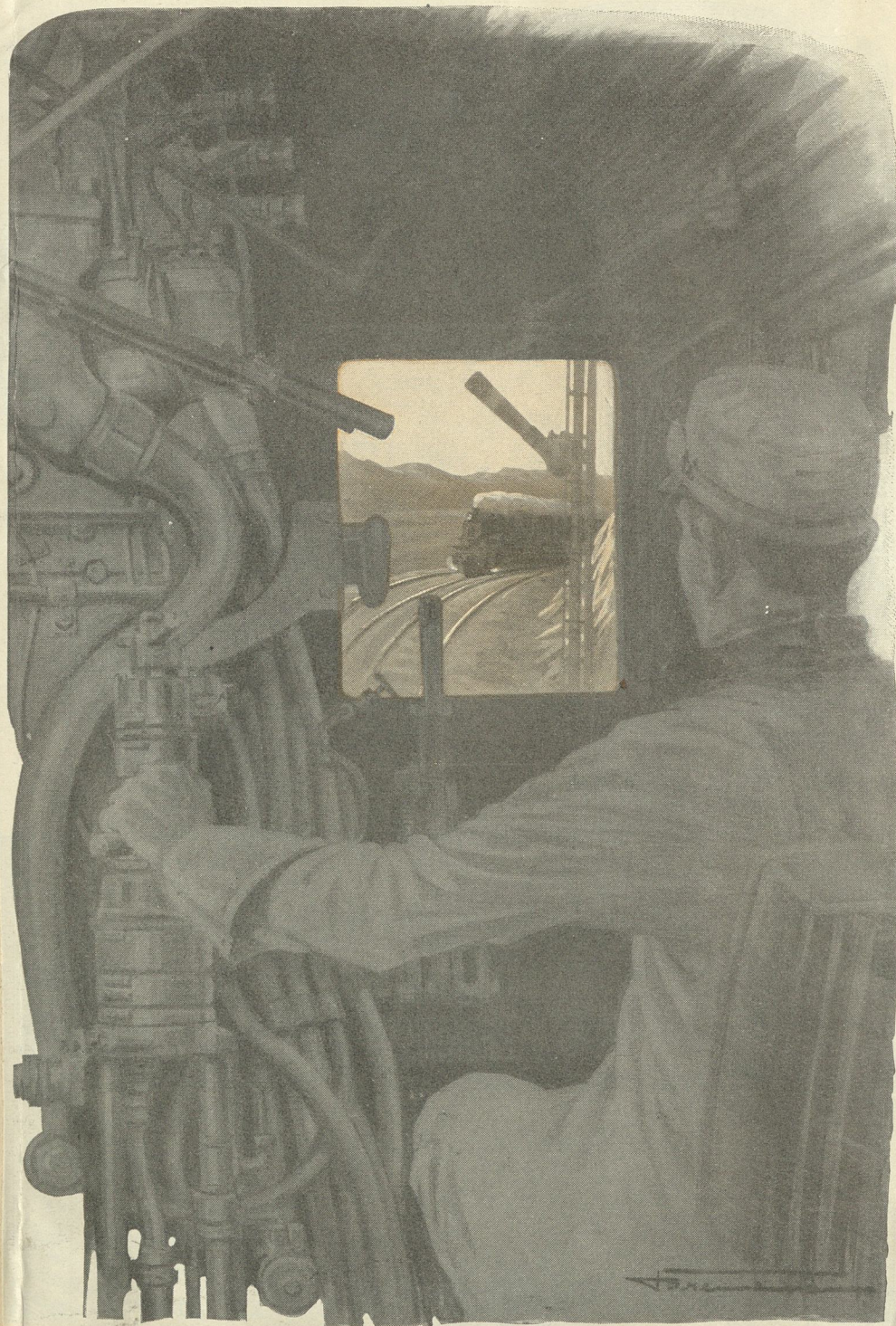
From Their Offices, Cool Dispatchers, by Orders Spoken through Selective Telephones, Keep Main-Line Traffic Moving on Their Divisions and Guide Trains Safely into Busy Terminals



Contrasting Views of Modern Rail-
roading; Brakeman Stopping a Freight
Car on Downgrade by Turning the Hand
Brake with Aid of Lever; Above Is a
Row of "High" Signals in One of the
Big Terminal Yards; Their Shaded
Amber Lights Burn by Day and Night
and Show, by Varying Positions, Clear,
Caution, Low-Speed, Stop and Other
Signs; They and the Yard Switches
Are Controlled from the Interlocking
Tower Room Shown in Operation Be-
low, Where Lever Men, Guided by Il-
luminated Map of Tracks, Direct More
than 300 Trains Daily

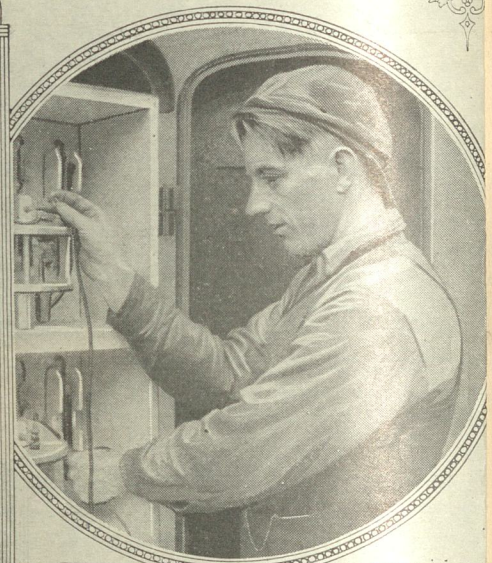
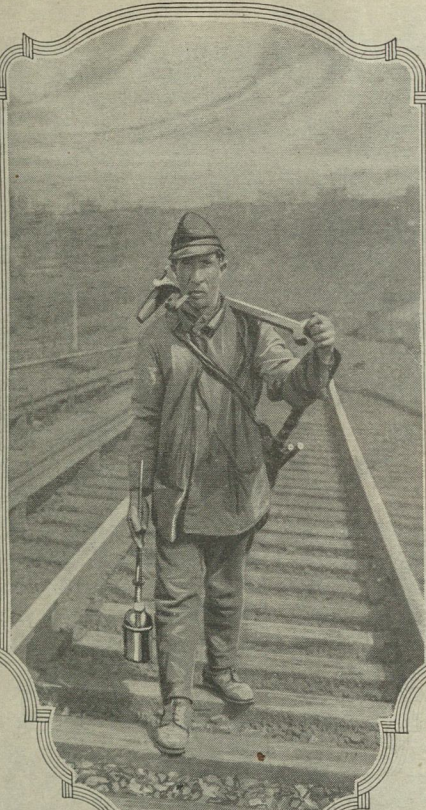


Center Photo, Copyright, Ewing Galloway

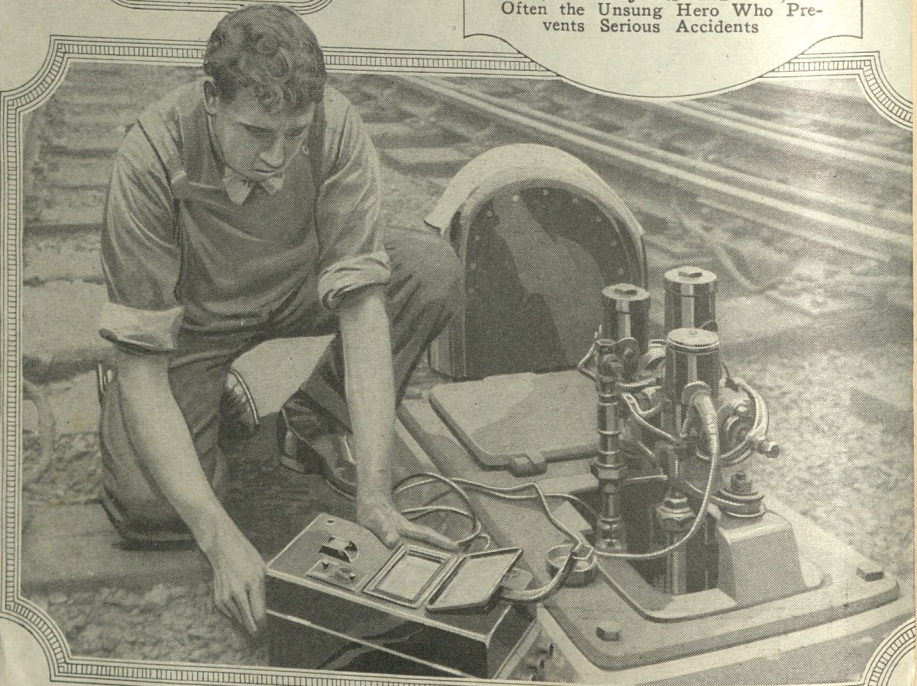


Beside the White-Hot Blast That Leaps and Curles and Foams at the Crown Sheet, the Engineer of the Big,
Racing Locomotive Keeps Ceaseless Vigil

From Their Offices, Cool Dispatchers, by Orders Spoken through Selective Telephones, Keep Main-Line
Traffic Moving on Their Divisions and Guide Trains Safely into Busy Terminals



Hundreds of Men the Passengers Rarely See Are Constantly at Work on Railroad Switching Apparatus and Tracks to Insure Their Safety, as Are the Signal-Battery Inspectors Shown Above and Below; Making His Rounds Day after Day, the Track Walker, by Detecting Faulty Rails, Loose Joints and Ties, Is Often the Unsung Hero Who Prevents Serious Accidents



Left and Lower Photos, Copyright, Ewing Galloway

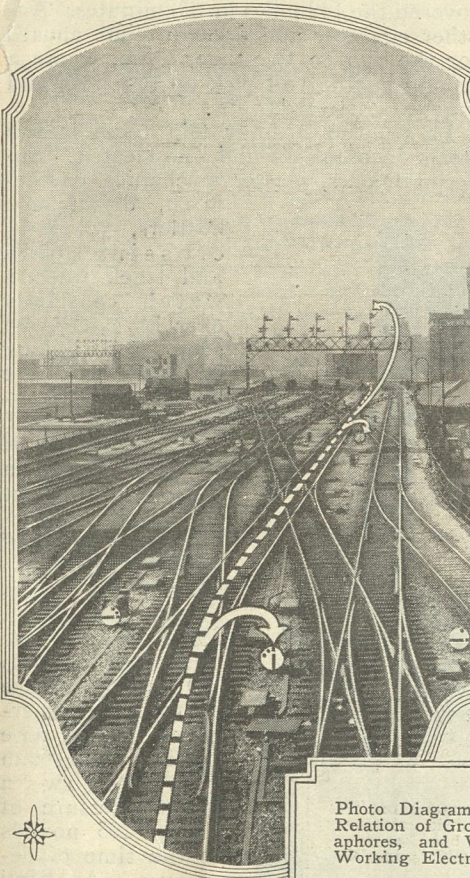
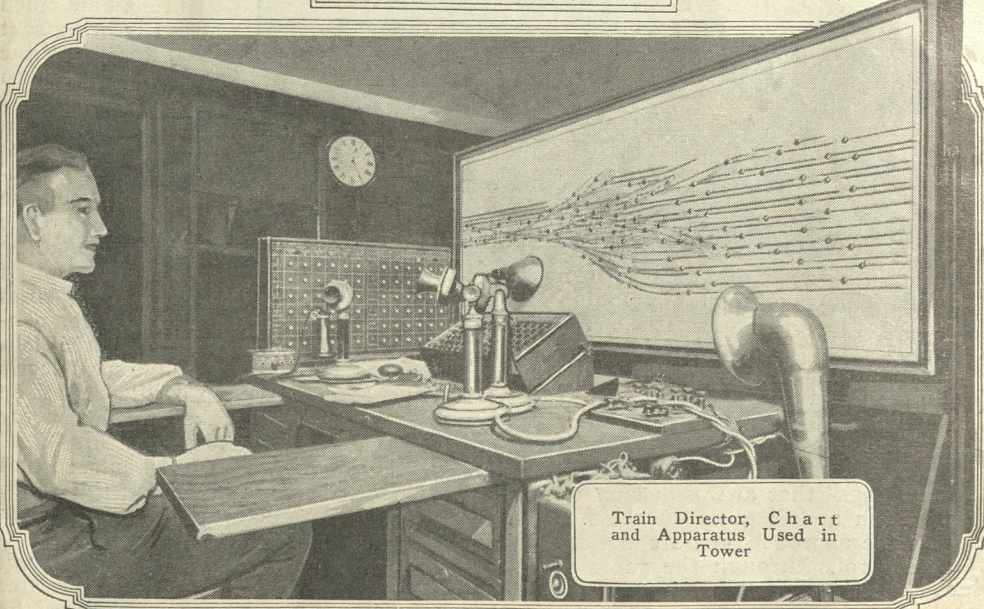


Photo Diagram of Yards, Showing Relation of Ground Signals to Semaphores, and View of Inspector Working Electric Relay Signal Box



Train Director, Chart and Apparatus Used in Tower

From Their Offices, Cool Dispatchers, by Orders Spoken through Selective Telephones, Keep Main-Line Traffic Moving on Their Divisions and Guide Trains Safely into Busy Terminals

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the engineer die at his post—a thing that is not unknown in the history of railroading.

Ahead, the light of an approaching engine twinkles on the horizon, grows to a blaze and then is dimmed to an almost imperceptible glow as the two trains pass. Dimming the headlights is required of all trains passing each other at night. At Davis, Ind., two dark slits appear between the rails, the 900-foot reservoirs from which the tender tanks are filled while the train is running. The Gotham slows down to thirty miles an hour and the fireman opens a flat door in the side of the tender and exposes a small lever. At a blast of the whistle, he pulls it, lowering a grooved tongue. As the train speeds along some 6,000 gallons of water shoot up the trough and into the engine tank, the overflow cascading down the sides of the tender, a reminder of the fact that it was less than a hundred years ago that Peter Cooper's first locomotive carried its water in two apple barrels. With the hum of giant bees the swaying cars move through the night. The wind roars past with the sweep of a gale. In the cab there is a dizzy clatter of noise, the occasional throb of the air pump and the hiss of the boiler cocks as the engineer tests his water level.

Above all the din comes the scream of the whistle—two long and two short blasts for the deadly grade crossing and a single note to warn the busy mail clerks in the cars behind to put out the arm for "snatch bags" that are picked up on the run. Soon a dull glow on the horizon signals the approach to Fort Wayne and the train rolls through the yards at reduced speed to the beckoning of swinging lanterns, and grinds to a stop, having

covered the 148 miles in 193 minutes. Another engineer and fireman climb aboard for the run to Crestline, Ohio, where a second engine will pick up the train and hurry it eastward.

In all, the 22-hour trip requires five steam locomotives and one electric. Superintendents, master mechanics, engineers, dispatchers, hostlers, wipers, crossing guards and track walkers watch constantly over its safety. At every stop clinking hammers try the wheels and the air-brakes are tested. A glance at one of the four gauges in the cab shows that the train is carrying 110 pounds of air for actual operation of the brakes in running and a red arrow on the same dial indicates 140 pounds for use in case the emergency brakes are applied. The steam gauge shows a boiler pressure of nearly 205 pounds at the time of departure. A third dial tells how much steam is being sent back to heat the train and a fourth shows how much pressure is used on the engine brakes when operated independently of the train. The throttle

and whistle cord are at the engineer's left hand. The reverse lever is in front of him and the air-brake levers, a big brass handle set below a smaller one for controlling the engine alone, at the left. Three boiler cocks are at different levels high up toward the top of the cab. The glass water gauge shakes as the engine sways and is considered only a "fifty-fifty" indication of the boiler's contents, so that the chief reliance is placed on the cocks.

Opening the cocks is a certain way of measuring. By the sound of the outrushing mixture, the engineer can easily tell if dry steam is escaping where water should be. He endeavors to keep the

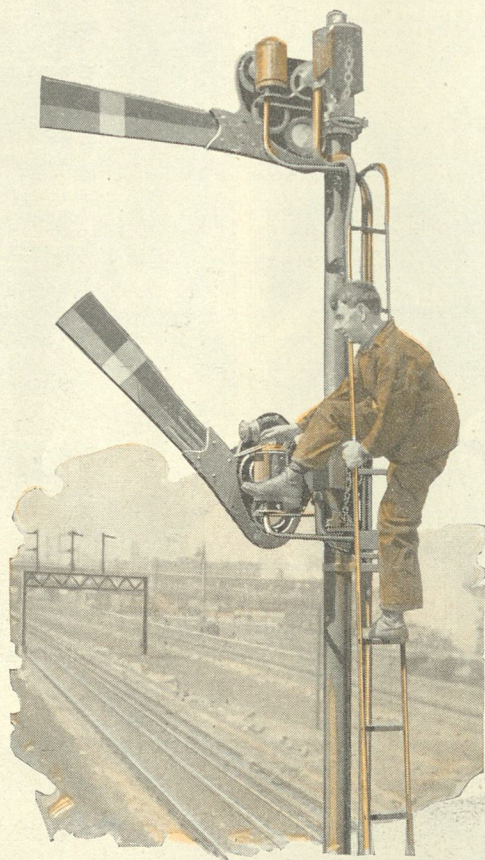
boiler filled just above the middle cock. This insures against too wet steam and water getting into the cylinders, cuts down on coal consumption and increases general efficiency.

Starting smoothly and without slipping or shaking the fire to pieces, stopping with a fine stream of sand running under the drivers to insure a firm hold for the wheels when the train starts again, keeping a speed that will fulfill the requirements of the schedule and get the most out of the coal and the engine and not cause the fireman useless labor are other points that are mastered only after years of experience. Making up the limited and getting it into the terminal before the engine is hooked on is the task of the yardmaster and his helpers. The Broadway limited normally consists of eight cars and the engine and tender. Once assembled, the train is generally kept intact as much as possible, although last minute orders may be received for an additional car or two to handle

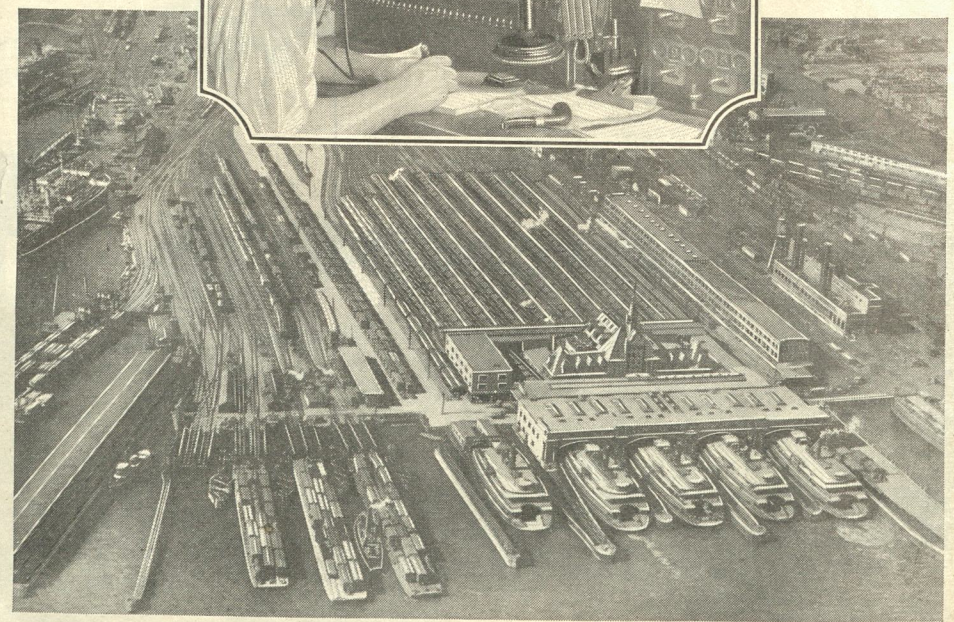
heavy traffic. If so, the yardmaster is informed and issues the required orders for alterations or additions to the train's equipment. In general, the yards are laid out so that the stubs from the main leads contain cars that have been switched and stored away according to their class so that they can be picked out and hooked to the train with a minimum loss of time.

Every car in the train has been subjected to a rigid inspection and cleaning and the engine itself, as part of the round-house routine, has been washed thoroughly with an emulsion of steam and oil, shot from a double-nozzled hose under ninety pounds' pressure. The blast rids all parts of the jacket, pistons and wheels of accumulated oil and dust and with a little wiping leaves the engine free from grime and rust. With this apparatus, two men can

easily clean from twelve to fourteen engines a day. Under constant inspections and frequent repairings an engine will last thirty years and more. Its life largely depends upon the



Copyright, Ewing Galloway
Another Guardian of the Traveling Public's Safety, a Semaphore Signal Repair Man at Work



Upper Photo Copyright, Ewing Galloway

From Their Offices, Cool Dispatchers, by Orders Spoken through Selective Telephones, Keep Main-Line Traffic Moving on Their Divisions and Guide Trains Safely into Busy Terminals

the engineer die at his post—a thing that is not unknown in the history of railroading.

A boiler, the vital part of the whole mechanism. Physical examinations of the engineer and firemen are conducted yearly after the men are past forty years old and they are constantly kept on the alert for the chance visit of an inspector.

When the train pulls out, its entire passage through the terminal is marked on a chart by the little green lights set at intervals along the pattern of the actual course of the track so that the lever men may follow the train's procedure through the area and set the signals properly as directed by other lights that flash below the lever handles. As the train puffs along past the switchtenders' stations, word of its passage is relayed by telephone from each station to the next one in advance. The dispatcher receives no report of it until it is outside the yards when it comes under his supervision.

"Alton Junction—No. 54—8:18" is the cryptic message the dispatcher receives. This gives him the name of the station calling, the number of the train and the time that it passed. He enters this information on his daily report of the train movements kept on a huge closely ruled sheet lying on the desk in front of him.

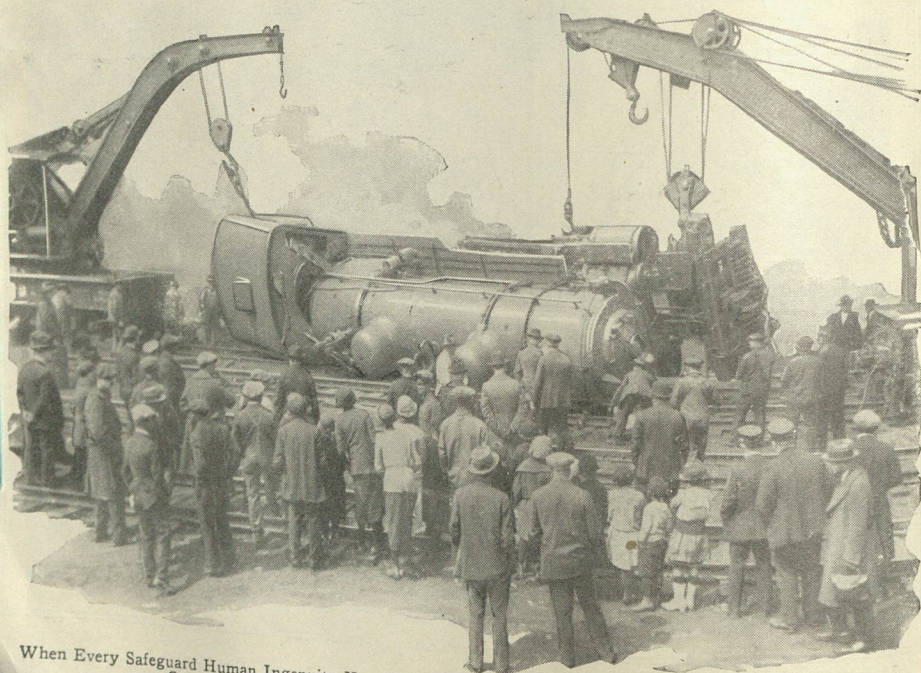
Similar messages come in as the train flashes by other stations. The dispatcher is the czar of all train movements in so far as they affect the main tracks on his

covered the 148 miles in 198 minutes. Another engineer and fireman climb aboard

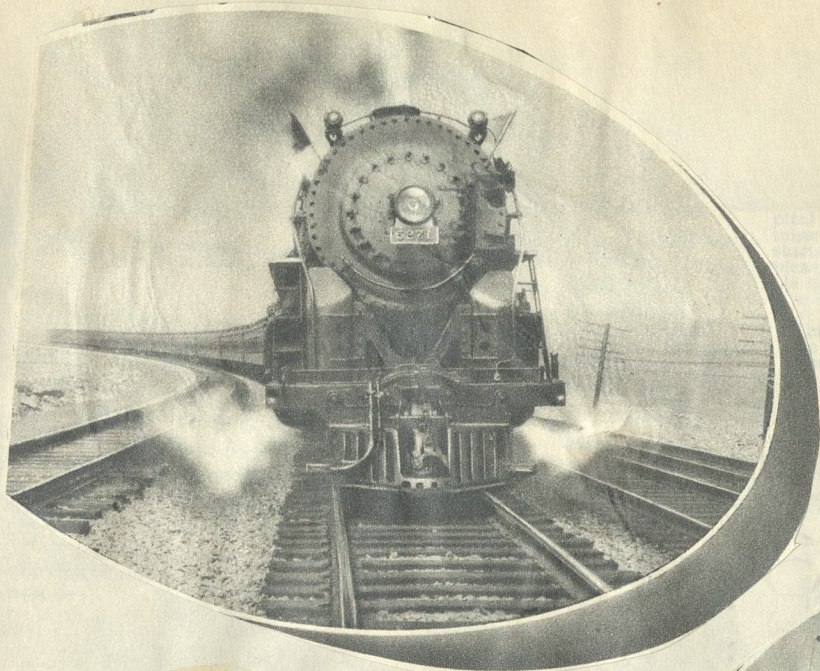
division. In his mind he has a picture of every foot of track and siding in his territory; he knows just how long a train can be accommodated in a certain block; he knows the running time and class of every train and is also able to judge almost to the second just how fast any engineer could get his train to the next point in case of emergency, a bit of strategy being necessary frequently and aided in successful operation by the fact that the names of the train crew also have been entered on the report sheet. His work is done entirely by telephone, the telegraph conveniently installed on his desk being used only when the telephone breaks down. Before him is a selective switchboard on which by the turn of a key he can call any one of the stations under his supervision. His wire is directly connected to each of the stations and they in turn have separate connections to each other.

Although today there are 375,000 miles of rails in the United States, carrying the lifeblood of commerce to the ends of the nation, in 1830 there were only twenty-three miles. What has been accomplished has been the result of the skill and genius of one of the nation's greatest industries.

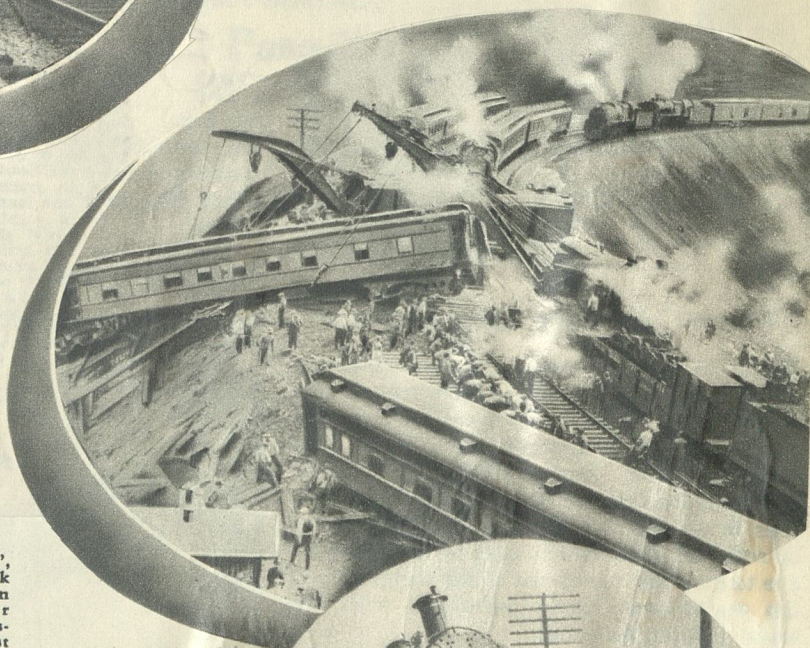
According to veteran railway men, however, the day of the steam locomotive is passing and the shadow of the giant electric engine is on the rails.



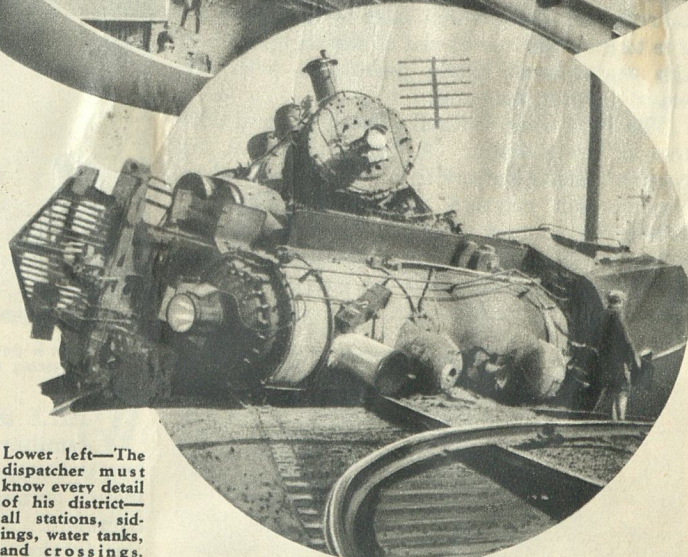
When Every Safeguard Human Ingenuity Has Devised Fails, and Wrecks Occur, Wrecking Cars and Powerful Cranes Quickly Clear the Tracks and Raise the Fallen Giants of the Rails



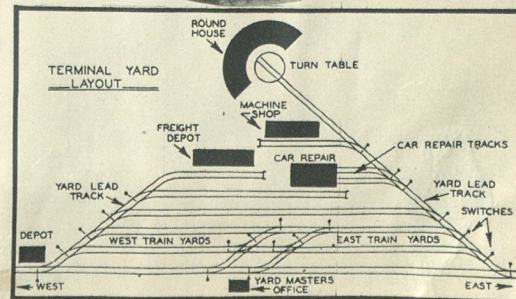
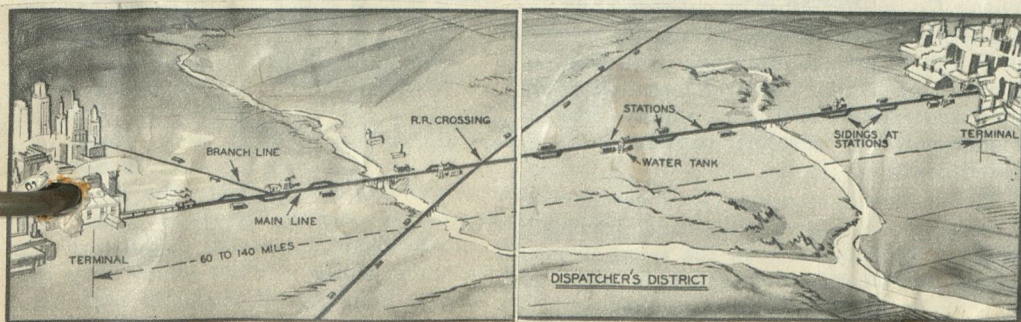
Above left—Photo shows the famous "Twentieth Century Limited", speeding between New York and Chicago. It is the duty of the train-dispatcher to keep the track ahead clear so that there will be no delay in the regular schedule times.



Right—The big "hook", or wrecker, clears the track to maintain fast traffic. In circle—Two passenger trains collide on a cross-track. Dispatchers must guard against such costly and delaying accidents.



Lower left—The dispatcher must know every detail of his district—all stations, sidings, water tanks, and crossings.



Above—A representative terminal yard layout showing tracks where trains await the dispatcher's orders to move.



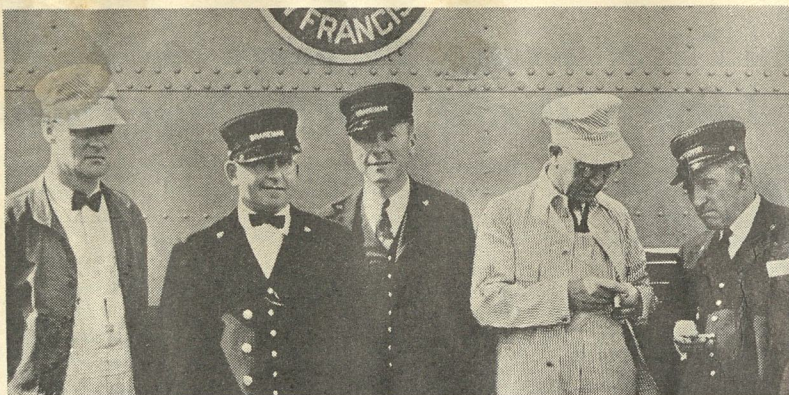
Over the Sierra . . . "City of San Francisco"

*U.S. Statesmen Travelers and Passengers
in Words of High Praise for New Train*

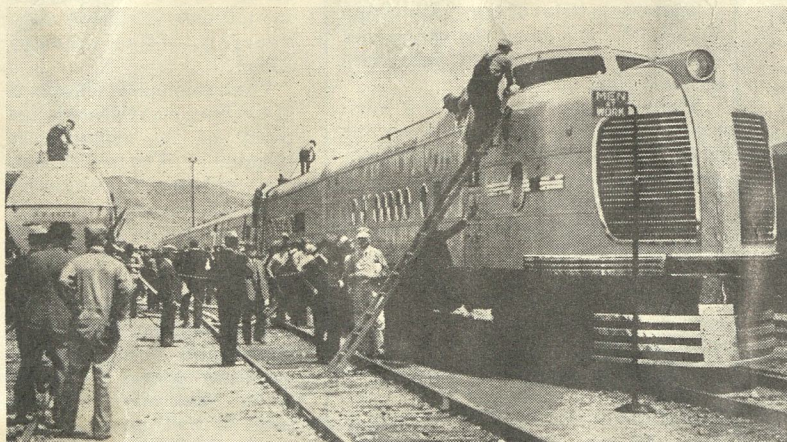
born and a new era of travel has begun with the arrival of the new train



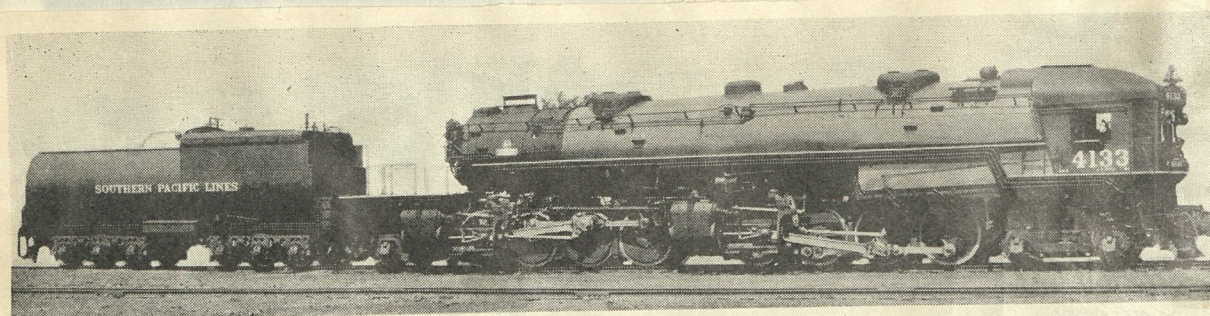
First High Speed Train . . . Coast Line Next



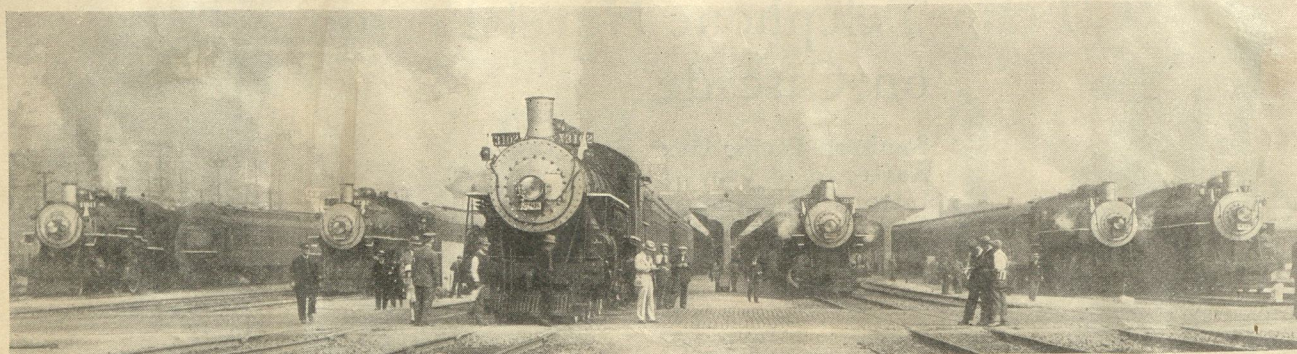
Crew on the "City of San Francisco's" first trip out of Oakland Pier June 14. These trainmen were aboard to Sacramento and the enginemen to Roseville. Then followed the Sacramento and Salt Lake Division crews on to Ogden. Left to right—Fireman A. P. Boyd, Brakeman W. H. Lorenz, Brakeman Geo. A. Kelly, Pilot-Engineer, Charles McCutcheon and Conductor A. Wiedemann.



The one refueling and servicing needed on S. P. lines is quickly handled at Sparks.

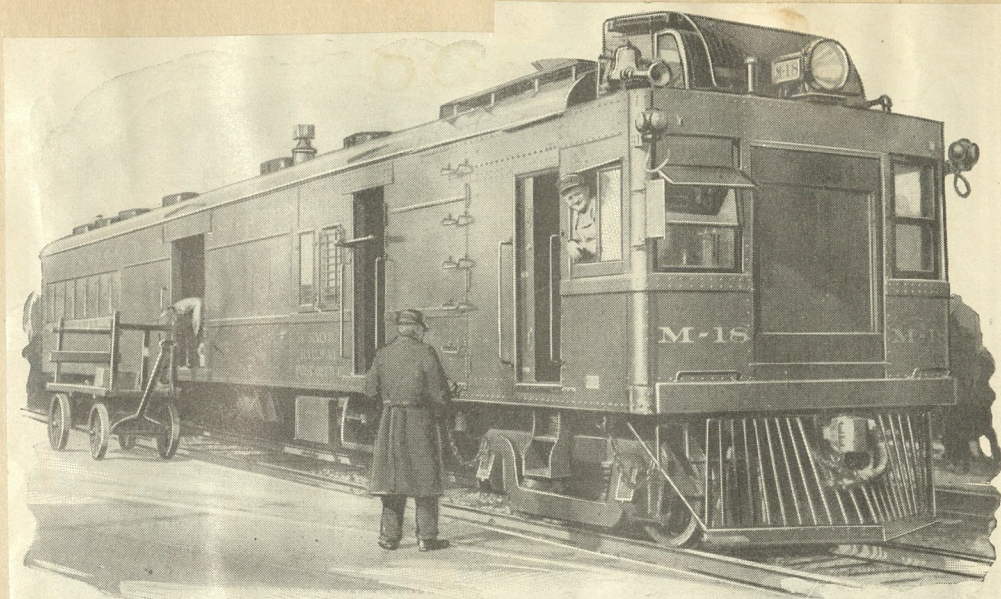


Of the 18 new locomotives just ordered by S. P., 12 will be of design similar to this 4-8-8-2 Class AC-6 locomotive. There are 51 of these cab-in-front engines now in service. They are the largest and most powerful ever operated on S. P. lines. Weigh 935 500 lbs. loaded; 121 ft. 4½ inches long; tractive power of 124,300 lbs. The new engines will be about 4½ feet longer and 78,000 lbs. heavier.

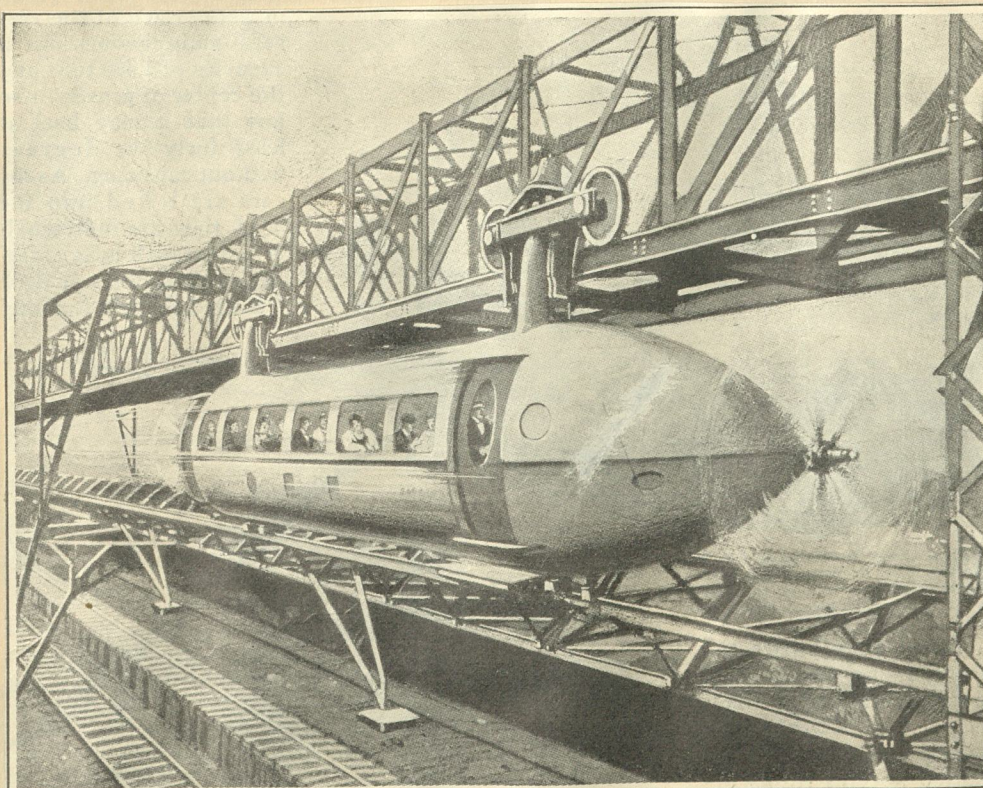
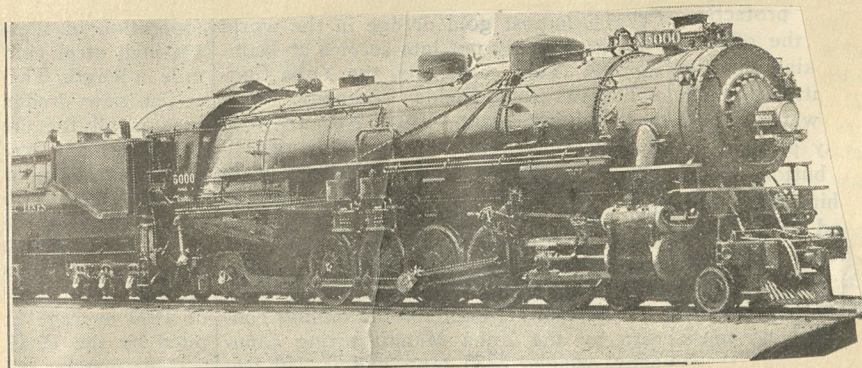


Special trains waiting at Third Street Station, San Francisco, to be loaded with passengers en route to the football game at Stanford stadium, Palo Alto, on November 23. On that day, 27 special twelve-car trains were dispatched from the station carrying 20,367 football fans. A movement almost as large was handled on October 26 when eighteen special trains carried 11,682 passengers to

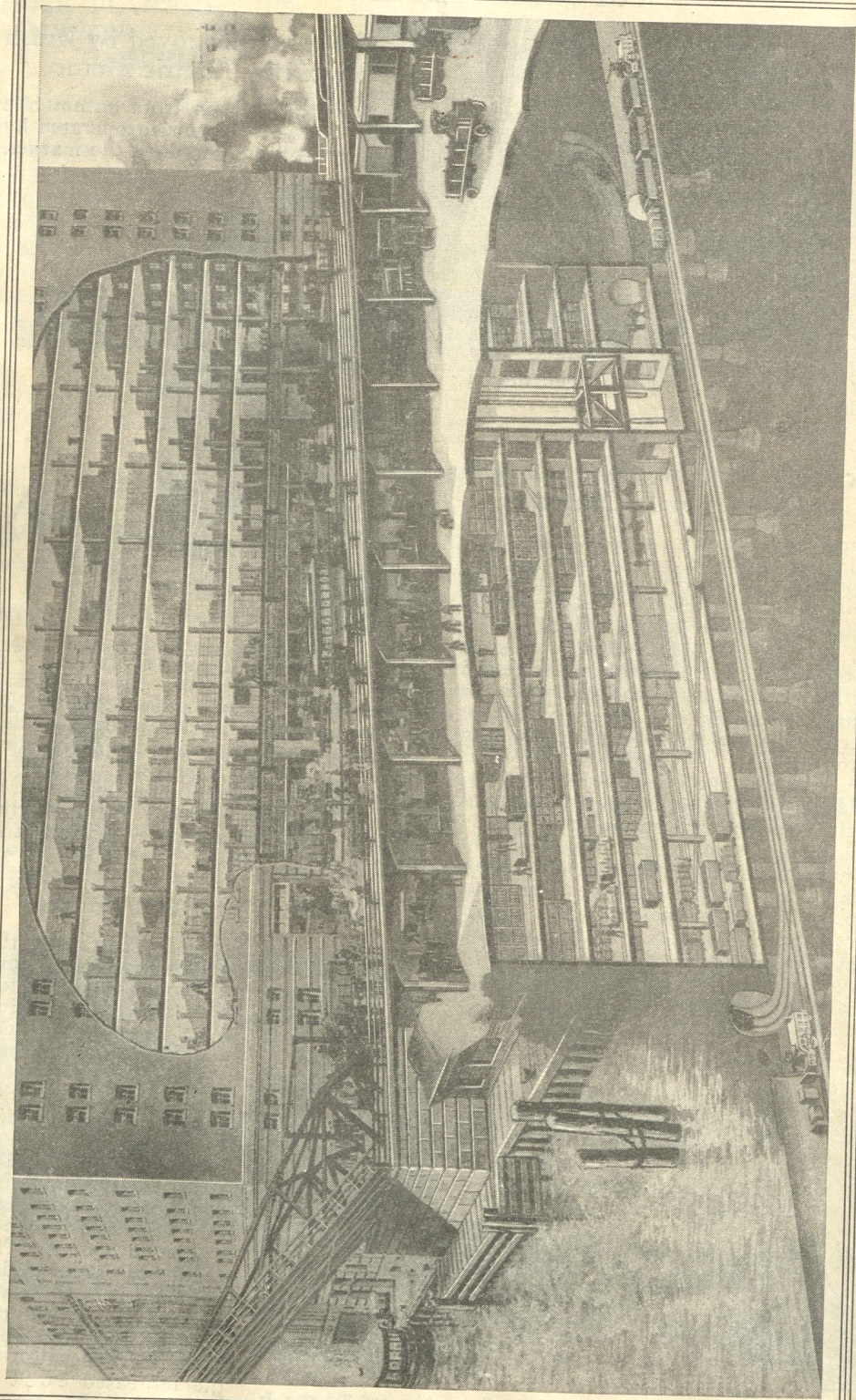
the Stanford-U. S. C. game. Every train made the 31-mile run in good time and no one was late for the opening "kick-off" of either game. A performance even more remarkable was made on the movement after the games on Nov. 23 when sixteen trains were loaded with 17,000 passengers within the first hour and made the return trip to San Francisco in an average of close to 60 minutes.



Built to Carry Mail, Express, Baggage and Passengers, and Haul a Trailer or Two if Necessary, the New Gas-Electric Coaches, Capable of Making Sixty-Eight Miles an Hour, Are Displacing Accommodation Trains



Running on a Frame Constructed above Railroad Tracks, This Propeller-Driven Car Carries Mail and Passengers at Two Miles per Minute; This Leaves Rails Free for Movement of Freight Trains



Freight Station in Sub-Basements under Wholesale House; Trains Made Up in Upper Basements Are Lowered by Elevator to Tunnel, on Fifth Underground Level

also left the train wrecked in the canyon.

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The DARK HORSE



Three of Twenty-five New Iron Horses for the Boston and Maine Railroad; Each Cost About \$100,000

RAILROADS appropriated a round billion dollars for improvements in 1930, and plan to spend more in the near future. On the other hand, passenger traffic slumped from 1,270,000,000, in 1920, to 779,000,000, in 1929.

The comparison between expenditures and the decline in passenger traffic might lead one to believe that railroad managers lack business sense. But our carriers manage to survive because only fourteen per cent of their total revenues derive from passengers; while freight tonnage has increased about nine per cent in the last decade.

Airplanes, busses, interurban street cars and river craft are competing with the iron horse on an alarming scale, offering one or a combination of the commodities which appeal most to the public: comfort, speed and economy.

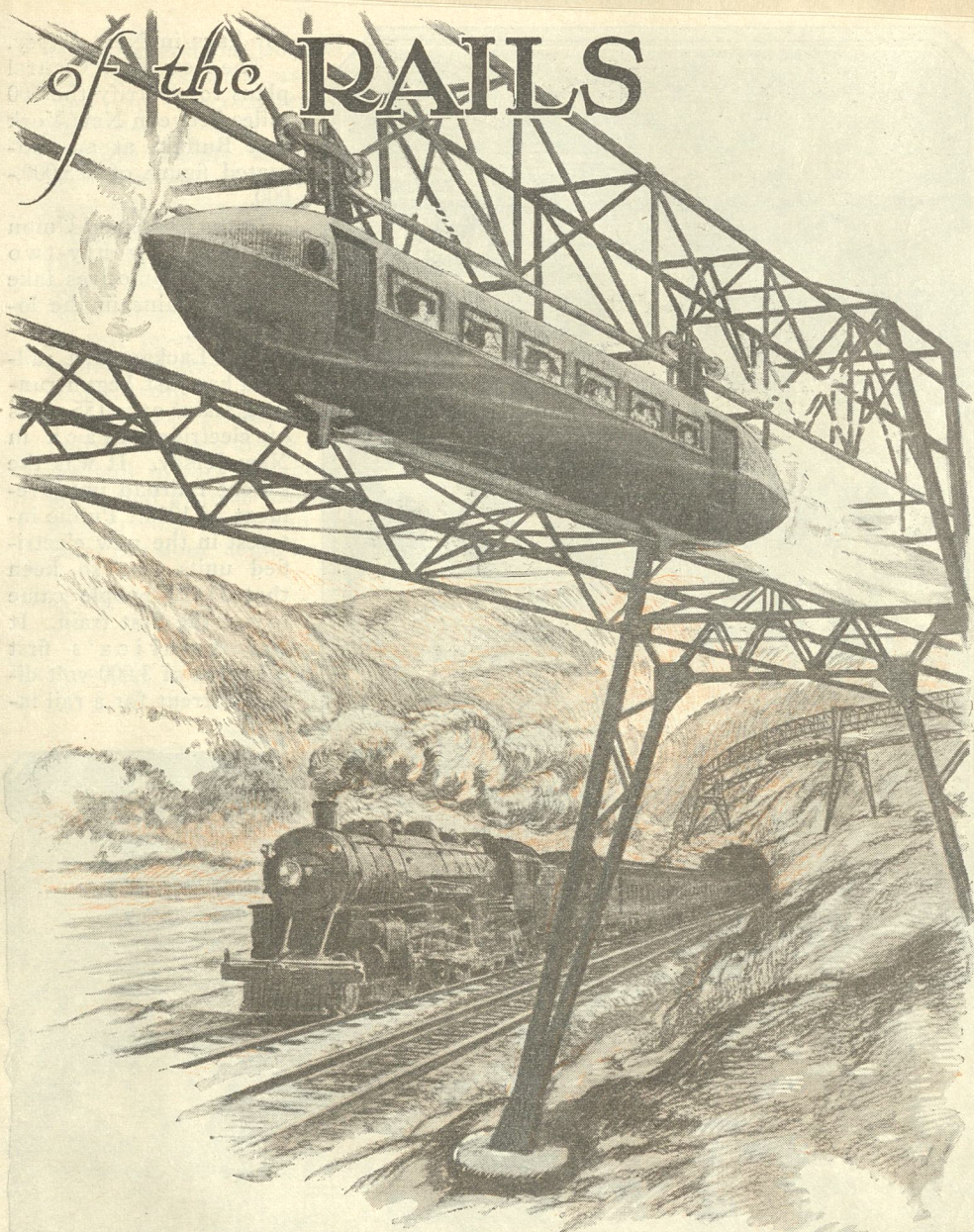
How do the railroads answer? A billion for improvements in one year and more billions to come. As regards comfort, neither the airplane nor bus can compare with a Pullman. Speed? The airplane surpasses the iron horse, but at a higher fare. And as for economy of operation, railroads have only begun to realize how profits grow with improved service and equipment.

What the railroads needed was a healthy competition, and now that they have it the public profits. Rail transportation receives more solid thinking these days than ever before. All the amazing improvements in the last decade are petty in comparison with what the next few years will witness.

To hold the dwindling passenger traffic and attract new customers, half a dozen roads are engaged in mammoth electrification projects, the largest between New York and Washington on the Pennsylvania. This \$100,000,000 plan exceeds in magnitude and importance that of any other railroad in the world, both in miles of track to be electrified, in volume and density of passenger and freight traffic handled, in size and amount of equipment, in number of trains affected, and in terminal operations involved. That, in short, is what the Pennsylvania plans in preparation for a New York with a metropolitan population of 30,000,000.

Passenger locomotives for this system have a 2,500-horsepower rating. Three hundred locomotives will be in daily use when the project is completed, about 1935. The line between Trenton and Philadelphia has already been opened. The pres-

of the RAILS



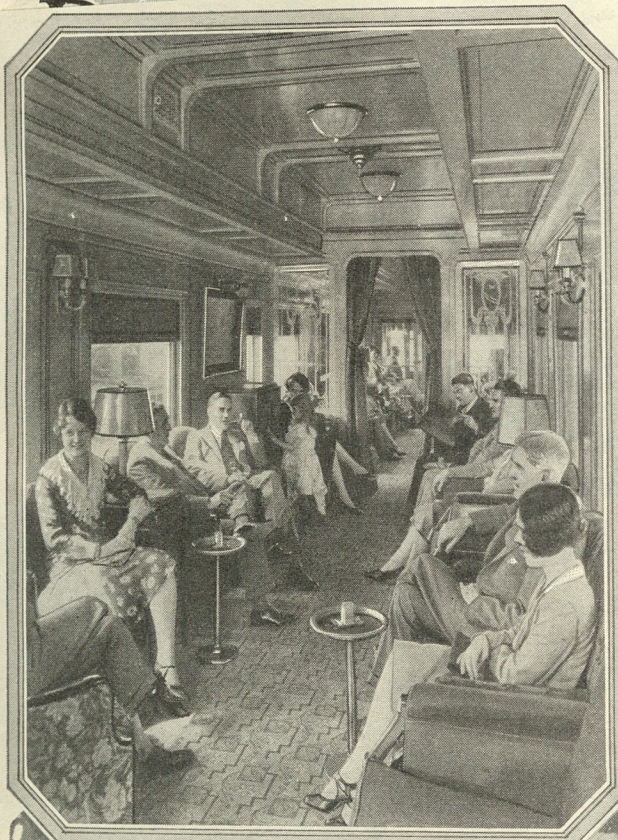
Drawing of Rail-Plane Line as It Would Appear near Railroad; Experiments with These Overhead, Propeller-Driven Cars Have Been Made Abroad and Promise Interesting Results

ent limited trains between Washington and New York make the 220 miles in 270 minutes. But the new electric express will probably make the same distance in ninety minutes less, which will compare favorably with airplane time.

Besides the Pennsylvania's, other electrification projects are under way or just completed. The Reading railroad is spending \$20,000,000 on 110 miles of track in the Philadelphia zone, and plans in the near future a \$32,000,000 appropriation

also left the iron horse wrecked in the canyon.

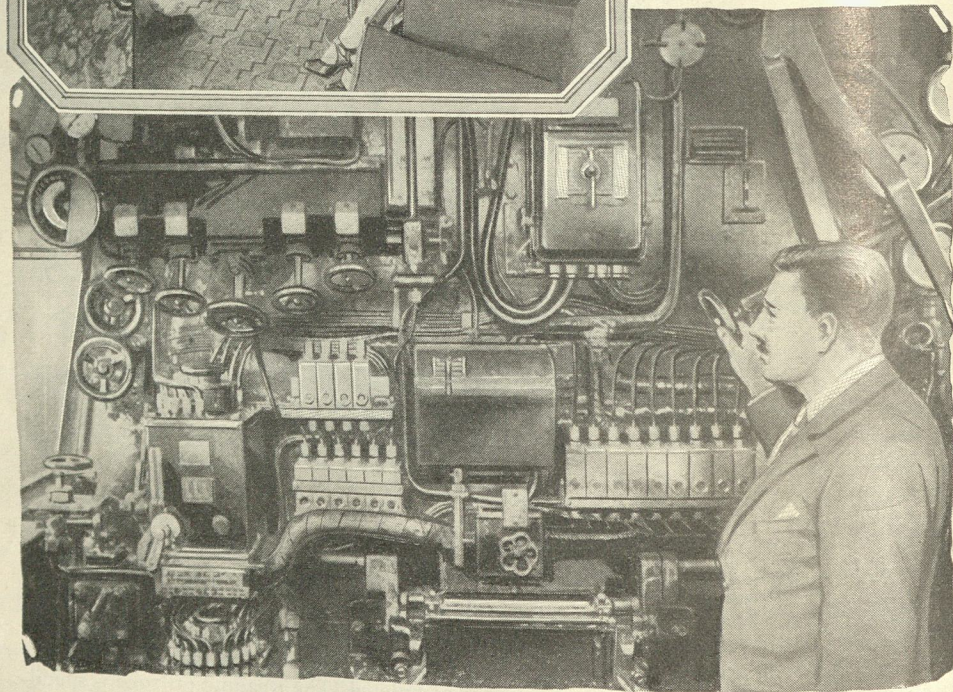
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for lines in New Jersey. The New York Central plans to electrify the 500 miles between New York and Buffalo at an estimated figure of \$75,000,000.

In the Cleveland Union Terminal, twenty-two 204-ton locomotives take care of trains in the local yards.

The Lackawanna railroad has just begun running trains over 155 miles of electrified track in New Jersey. It was the salient railroad improvement of 1930. Public interest in the new electrified units was so keen that 25,000 people came to see the first train. It was America's first adoption of 3,000-volt direct current for a rail in-



Inside a Luxurious Union Pacific Lounge Car, and Interior of High-Pressure Locomotive Built in Germany; This Is a View of the Control Board; Pressures as High as 1,700 Pounds to the Square Inch Are Developed in Some of These Engines

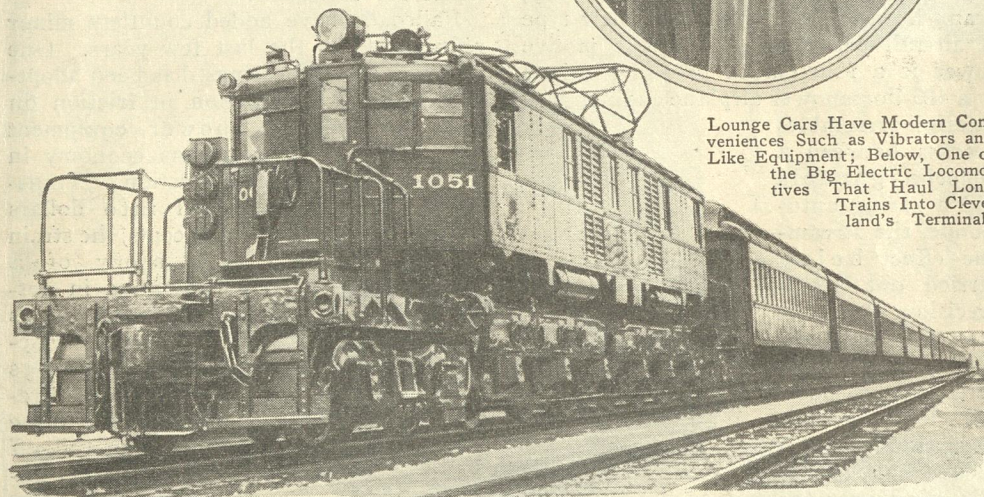
stallation, and also the first time mercury-arc rectifiers were used exclusively for supplying direct-current power. About 900 miles of wire and cable, weighing 3,220,000 pounds, were used on the job. And 4,000 tons of steel were necessary to carry this wiring system.

Electric motors enable the train to gather speed four times faster than steam trains. If an engineer should be taken suddenly ill and remove his hand from the control lever, "dead-man" operation becomes effective and brings the train to a smooth stop.

Must steam give way to electricity? Some railroad experts argue that steam engines are still in their infancy. One engineer holds that a steam locomotive with a 110-inch driving wheel and able to travel 125 miles per hour, could be built for \$110,000.



Lounge Cars Have Modern Conveniences Such as Vibrators and Like Equipment; Below, One of the Big Electric Locomotives That Haul Long Trains Into Cleveland's Terminal



Whatever the future of the iron horse, railroads are piling more steam into his joints and making him sprint across mountains and prairies as he never traveled before. Recently, the Canadian National railroad inaugurated the first two-way train telephone service in the world, enabling a passenger to phone South America or Italy while traveling seventy miles an hour. Simultaneously the company began operating its International Limited, between Montreal and Chicago, on a record-breaking schedule. It covers the distance between Montreal and Toronto, 334 miles, in six hours flat, an average of fifty-five and two-thirds miles per hour,

which makes it the fastest train in the world over a similar distance.

In 1923, the time between Chicago and Los Angeles was sixty-eight hours thirty-five minutes; it is now fifty-six hours. Over a similar period, train time between Washington and New York has been cut down thirty minutes; between New York to St. Louis, two hours ten minutes; between New York and Boston, twenty-five minutes; between New York and New Orleans, three hours thirty-five minutes; between New York and Miami, twelve hours; between Chicago and San Francisco, twelve hours twenty minutes; instead of one twenty-hour train between

also left the train wrecked in the canyon.

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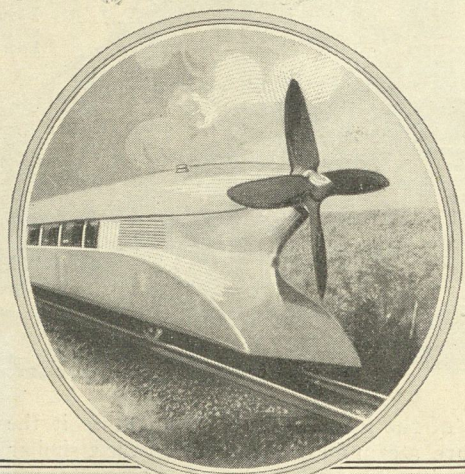
New York and Chicago, we now have sixteen such running daily.

Although present train speed hardly approaches that of the airplane, it is plain that each year sees new reduction in time, and a sixty-mile-per-hour average in the next few years may be as common as fifty miles today.

While the future of steam still remains in doubt, experimenters are testing some sensational inventions in rail transportation. For one thing, the monorail system is being considered as a possible link to New York City in case steamship companies decide to land transatlantic passengers at Montauk Point, L. I., thus making possible a four-day voyage from Europe. From plans already drawn, monorail electric trains can be made to travel more than 100 miles an hour with safety.

In recent test at Hanover, Germany, Franz Kruckenberg tried out a new type of air-rail passenger car, whose motive power is a four-bladed propeller driven by a 400-horsepower airplane engine. The exterior resembles a cross between a Zeppelin gondola and a racing automobile, the streamline effect being carried out with precision.

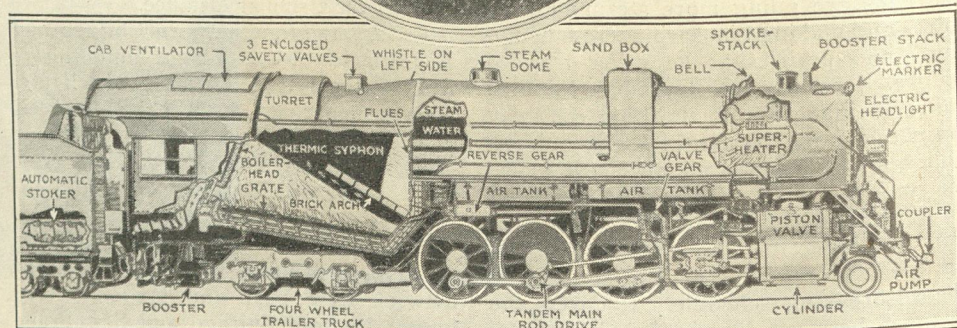
As for acceleration, Kruckenberg's car is peerless. Sixty seconds after starting from a dead halt, it was skimming over the rails at sixty miles



per hour. A few seconds later, it clipped 100 miles per hour, and in a secret trial it is said to have developed 114 miles per hour. Weighing twenty tons, the eighty-five-foot car accommodates forty passengers in parlor-car style. Railroad and automobile brakes bring it to a stop. This strange omnibus-Zeppelin may be an effective answer to bus competition.

Still another way to meet bus competition was demonstrated recently by the London, Midland and Scottish railway company. It operates a car equipped with two sets of retractable wheels, one set with flanges for travel on rails, and the other set with pneumatic tires for ordinary road travel. A gasoline engine provides power. Drive and controls are similar to those on busses. With special machinery, the driver can raise or lower either set of wheels.

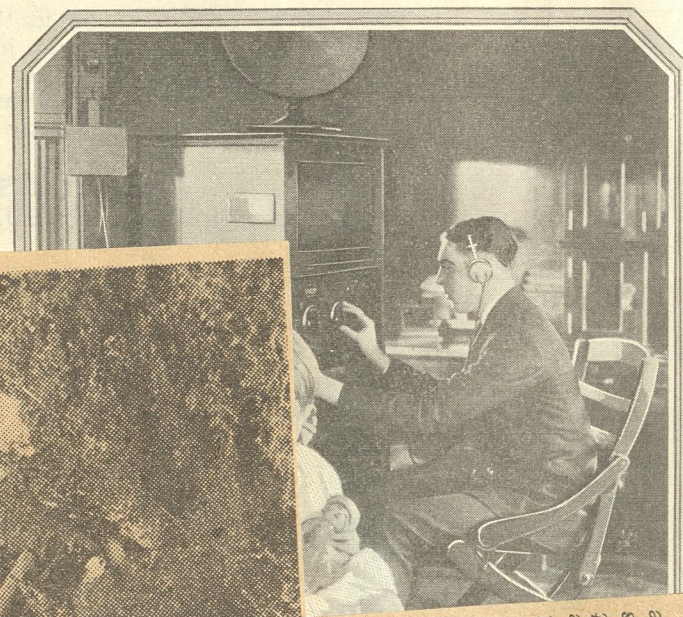
Railroads have added countless minor refinements in the last few years. One innovation, ball bearings, has been adopted widely. A reduction in friction on power equipment means economy in operation. Translated into dollars and cents, the strain and agony of a locomotive in getting under way is quite costly. Frictionless bearings have so reduced resistance that three women can walk off with a 200-ton engine, and three or four boys can pull



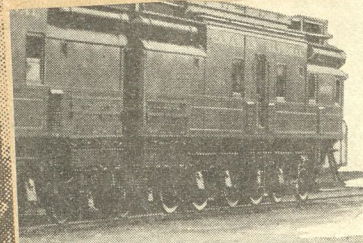
Propeller at Rear of German Zeppelin Rail Car, and Diagram of Late Steam Locomotive, Showing Refinements That Make It a Better Worker than the Old Locomotive

a full-grown Pullman car. And a standard Pacific-type locomotive can handle a twenty-one-car train equipped with roller bearings as easily as a twelve-car-train equipped with the old friction bearings.

Since speed is



Four members of the crew on a California Door Company logging train escaped injury Tuesday when the locomotive crashed through a high trestle over the North Fork of the Cosumnes River, ten miles above Diamond Springs, El Dorado County, and then came to a precarious stop, its pilot pointed downward. Two cars also left the track and were wrecked in the canyon.



railways, and No 9,000, King of Oil-inghouse Electric Company

greatly reduced. Labor in track laying and service is reduced eighty per cent; saving in maintenance of track \$2,000 per mile per year; higher speed, less fuel. The initial cost of such a road is high, but the ultimate cost favors concrete.

And No One Was Injured!

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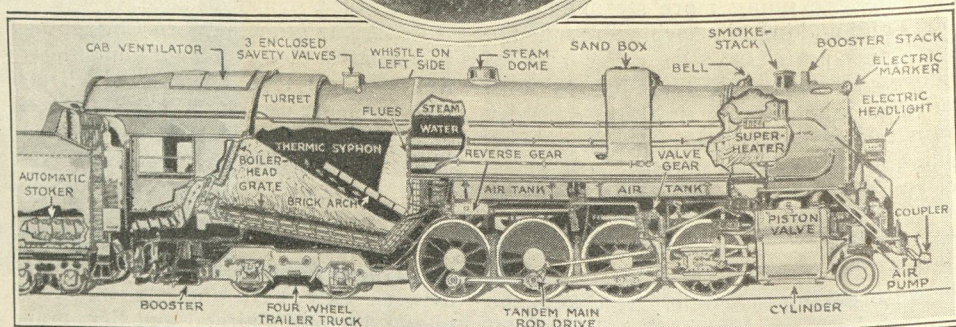
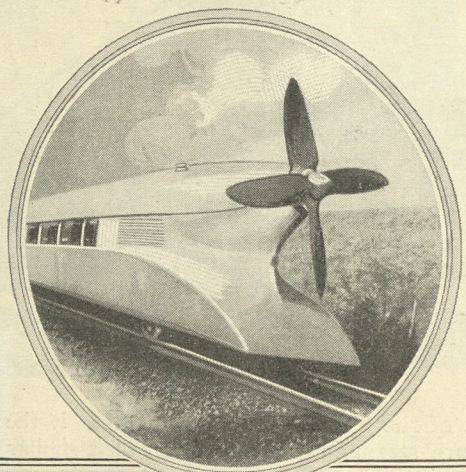
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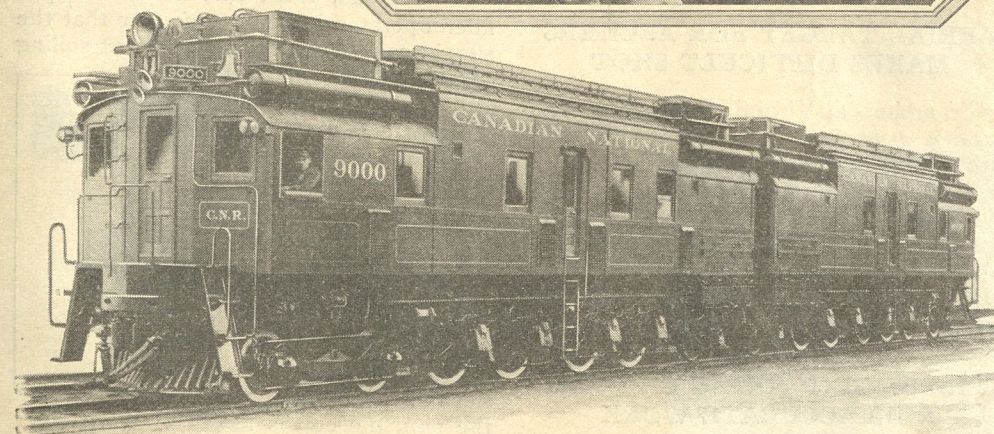
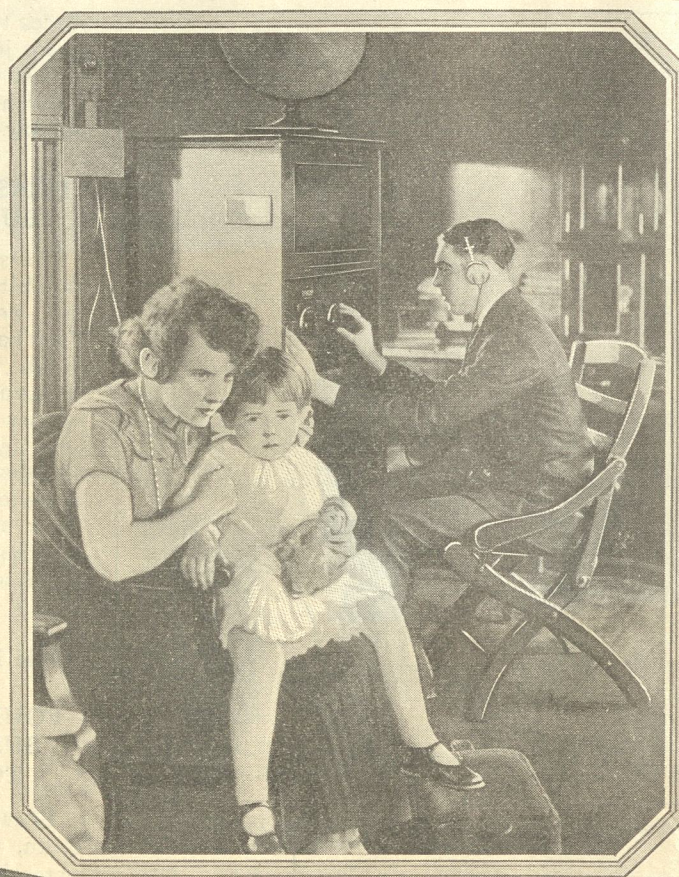


Propeller at Rear of German Zeppelin Rail Car, and Diagram of Late Steam Locomotive, Showing Refinements That Make It a Better Worker than the Old Locomotive

a full-grown Pullman car. And a standard Pacific-type locomotive can handle a twenty-one-car train equipped with roller bearings as easily as a twelve-car-train equipped with the old friction bearings.

Since speed looms as a great factor in rail transportation, engineers have studied everything pertaining to it. Their attention is naturally focused on rails and roadbeds. For you cannot get high velocity out of a lightweight steam or electric locomotive. Foundries are now turning out 800,000-pound iron horses, and the crushing weight of these engines traveling at high speed necessitates a high-grade roadbed.

The Pere Marquette railroad has developed a new type of concrete roadbed that calls for



Listening to Radio Program in Observation Car of Canadian National Railways, and No 9,000, King of Oil-Electric Locomotives, Built under the Supervision of the Westinghouse Electric Company

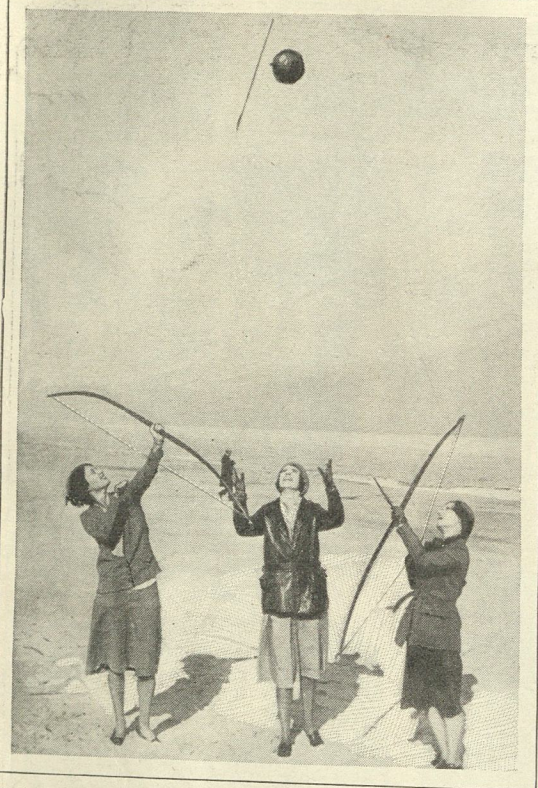
earnest consideration. After exposing the test section to a two-year trial, the experimenters report some real advantages: Expansion and contraction are confined to each rail as a unit. Settlement has been slight. The possibility of rail fracture is

greatly reduced. Labor in track laying and service is reduced eighty per cent; saving in maintenance of track \$2,000 per mile per year; higher speed, less fuel. The initial cost of such a road is high, but the ultimate cost favors concrete.

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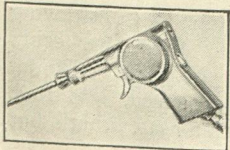
Girl Archers Shooting at a Rubber Ball Tossed Into the Air, the Target Providing a Difficult Mark

AERIAL TARGET FOR ARCHERS MAKES DIFFICULT SHOT

Girl archers at Virginia Beach, Va., who became so proficient that sticking arrows into a stationary bull's-eye was tame sport, decided to add to their prowess by shooting at a moving aerial target. This target is a large rubber ball which is tossed high into the air. The archers try to puncture it as the sphere rises or descends, a difficult feat even at close range.

PISTOL-GRIP METAL CHIPPER AIDS ACCURATE WORK

Operated by compressed air, a chipper, for working in metal, stone and other materials, has a pistol grip which helps reduce fatigue and also promotes greater accuracy. It re-



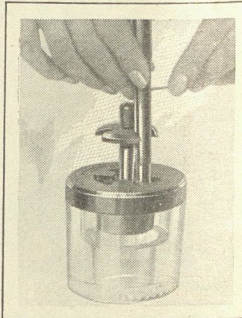
places the hammer and chisel on many jobs and is easy to use in almost any position. Chisels of different size and shapes are quickly inserted in the barrel.

GRASSHOPPERS FOUND BURIED IN GLACIER

Grasshopper glacier, lying at an altitude of more than 12,000 feet northeast of Yellowstone Park has been visited by an expedition from the University of Wisconsin searching for grasshopper remains buried in the ice ages ago. The rock crevices on all sides were found filled with the grasshoppers, layers several feet thick in near-by stream beds indicating the tremendous number of insects once imbedded. Most of the material consisted of the hard, scaly parts, but almost whole insects also were found.

FOUNTAIN-PEN FILLER SUPPLIES INK ONLY TO PROPER LEVEL

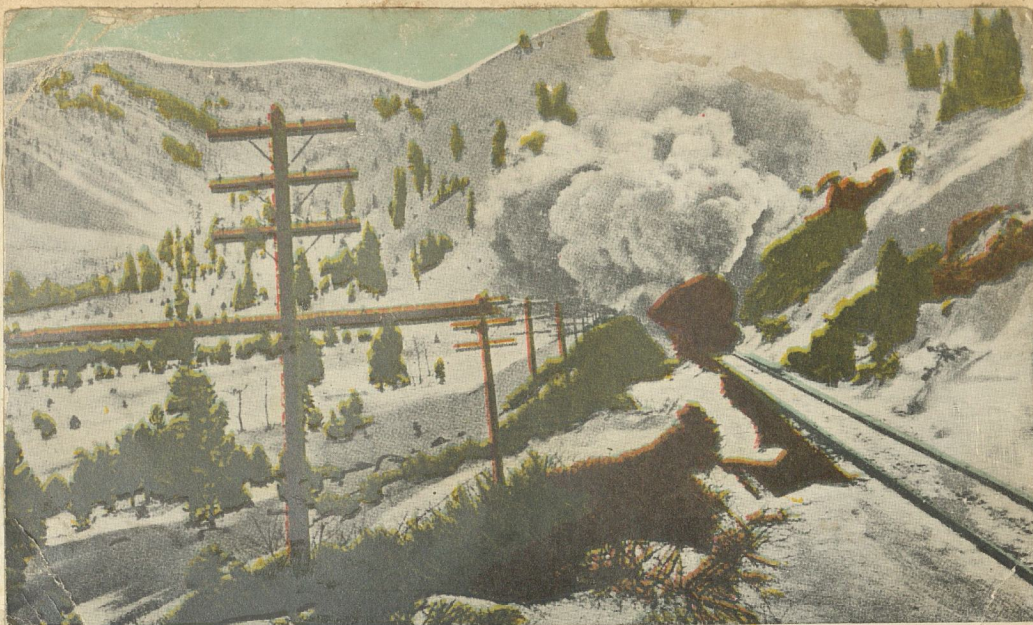
Providing a ready supply of clean, fresh ink, a fountain-pen filler operates in such a manner that the supply can be replenished without soiling either fingers or pen holder. It consists of a glass container with a recess in the bottom in which rests a hard rubber cap. To the bottom of the cup is attached a handle that extends through the rubber top of the holder. In filling the pen, the cup is raised by the rubber knob until it rests beneath the openings in the top, which are of various sizes to fit different pens. The pen is inserted in the proper opening and rests there with slight pressure to hold the cup in place, while the filling device of the pen is operated. When the pen is withdrawn, the top closes automatically.



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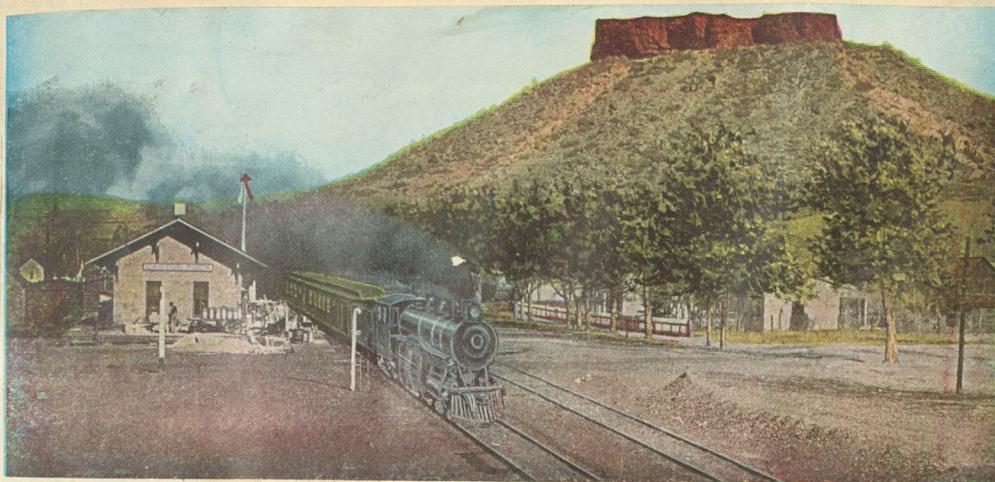


Horseshoe Bend near Truckee, Cal.



RAILROADING THREE MILES ABOVE THE SEA

Some one facetiously has said that the Central Railway flirts with the moon and makes faces at the Milky Way.



5954. Castle Rock, Colorado

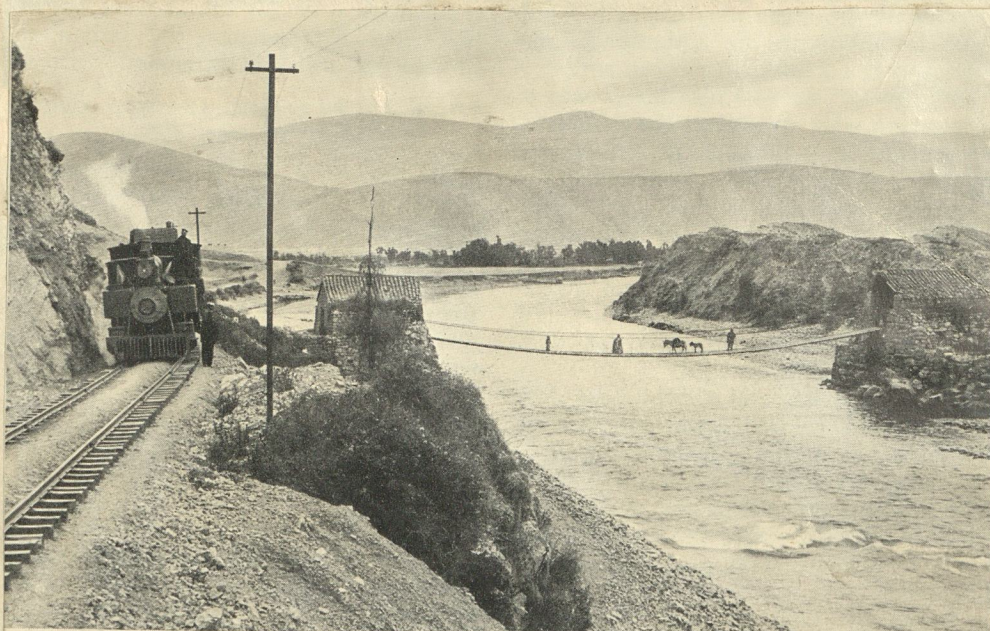
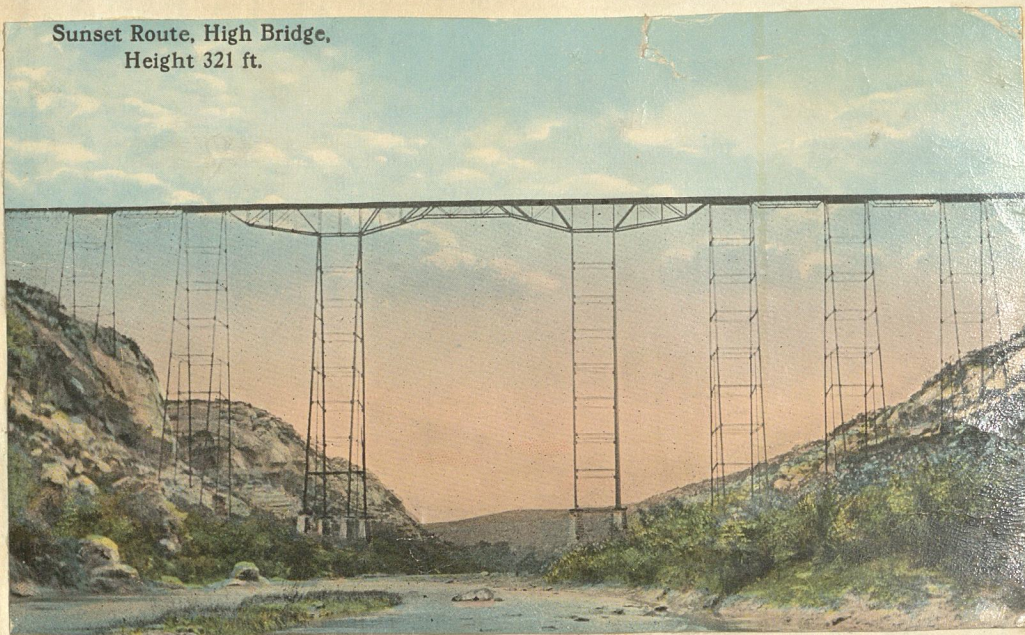


Photograph Courtesy of Canadian Government Motion Picture Bureau

THE QUEBEC BRIDGE, SPANNING THE ST. LAWRENCE, IS ONE OF MAN'S GREATEST ENGINEERING FEATS

Over the structure passes the transcontinental railway line from the south to the north banks of the St. Lawrence, as well as vehicular and pedestrian traffic. It has a total length of 3,229 feet, the center span is 1,800 feet, and the length of the suspended portion of the center span is 640 feet. For a length of 760 feet the center span is 150 feet above the high-water level of the river. Twice the bridge collapsed during construction.

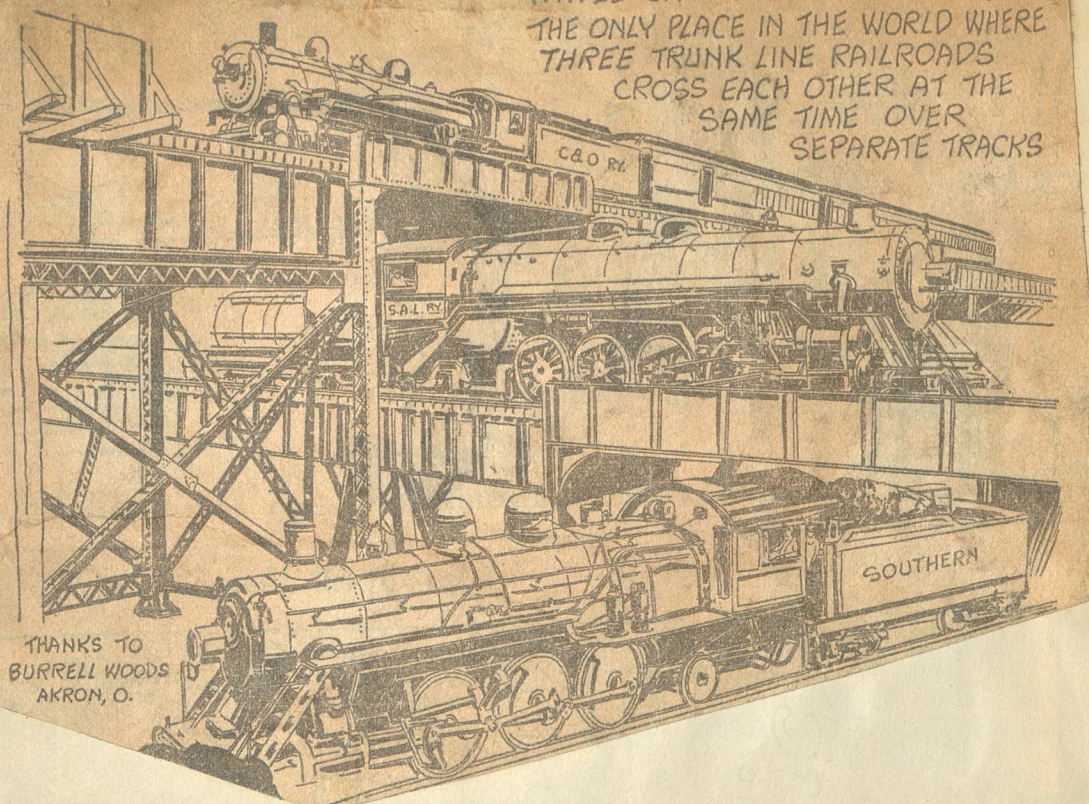
Sunset Route, High Bridge,
Height 321 ft.



© Ewing Galloway

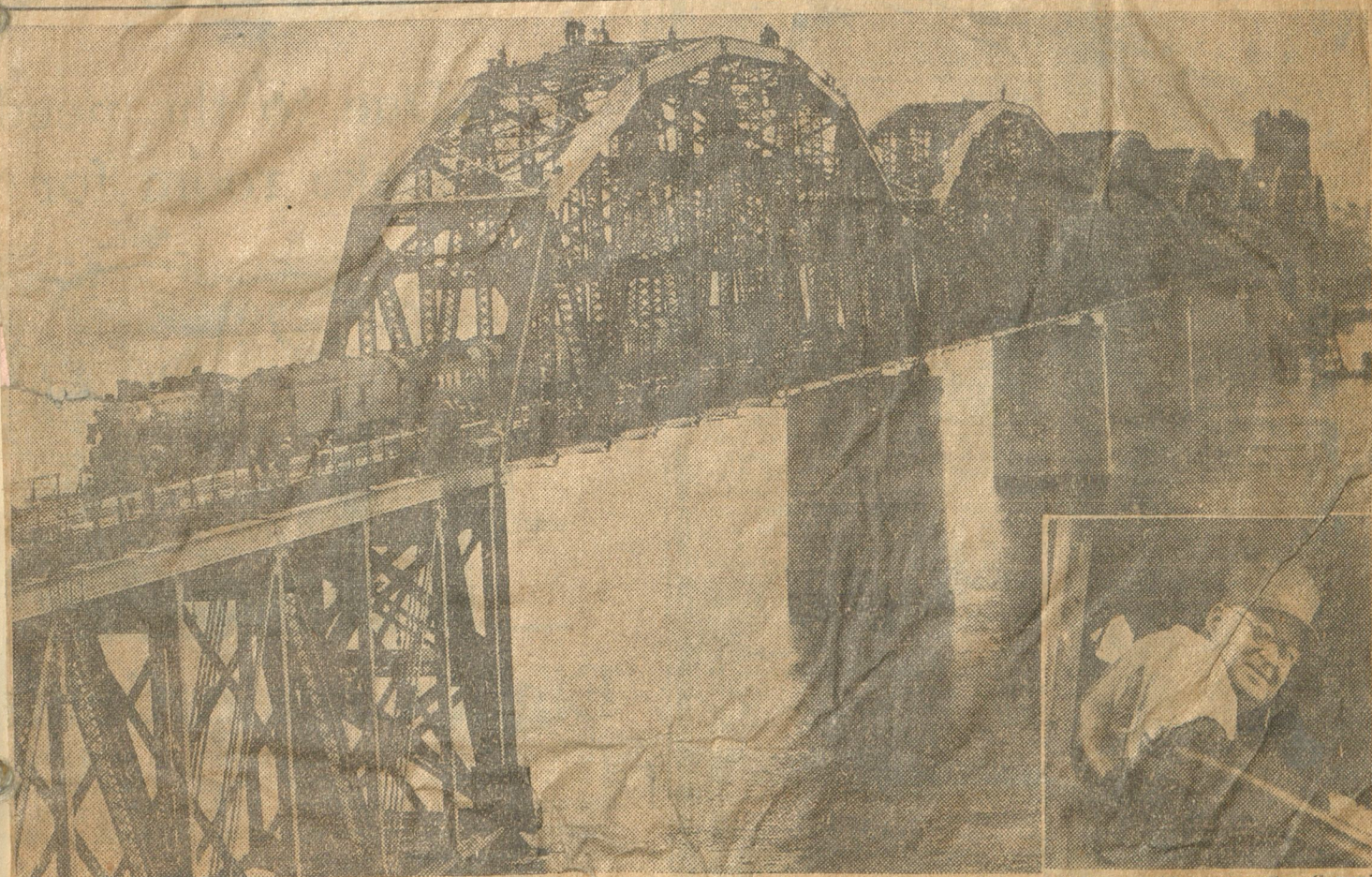
AN OLD SPANISH BRIDGE INVITES COMPARISON WITH AN EXAMPLE OF MODERN RAILWAY ENGINEERING IN THE HUANCAYO VALLEY

TRIPLE CROSSING....Richmond, Va.
THE ONLY PLACE IN THE WORLD WHERE
THREE TRUNK LINE RAILROADS
CROSS EACH OTHER AT THE
SAME TIME OVER
SEPARATE TRACKS



THANKS TO
BURRELL WOODS
AKRON, O.

First Train Crosses New Martinez Bridge



Above is shown No. 30, the Governor, the first train to cross the Southern Pacific Company's new \$12,000,000 bridge over the Carquinez gats. After this exclusive photo was taken it was rushed to The Bee on the train. Below is Engineer Thomas Steins of the El Dorado, second train to cross the bridge, as taken by The Bee cameraman as the El Dorado left Sacramento.



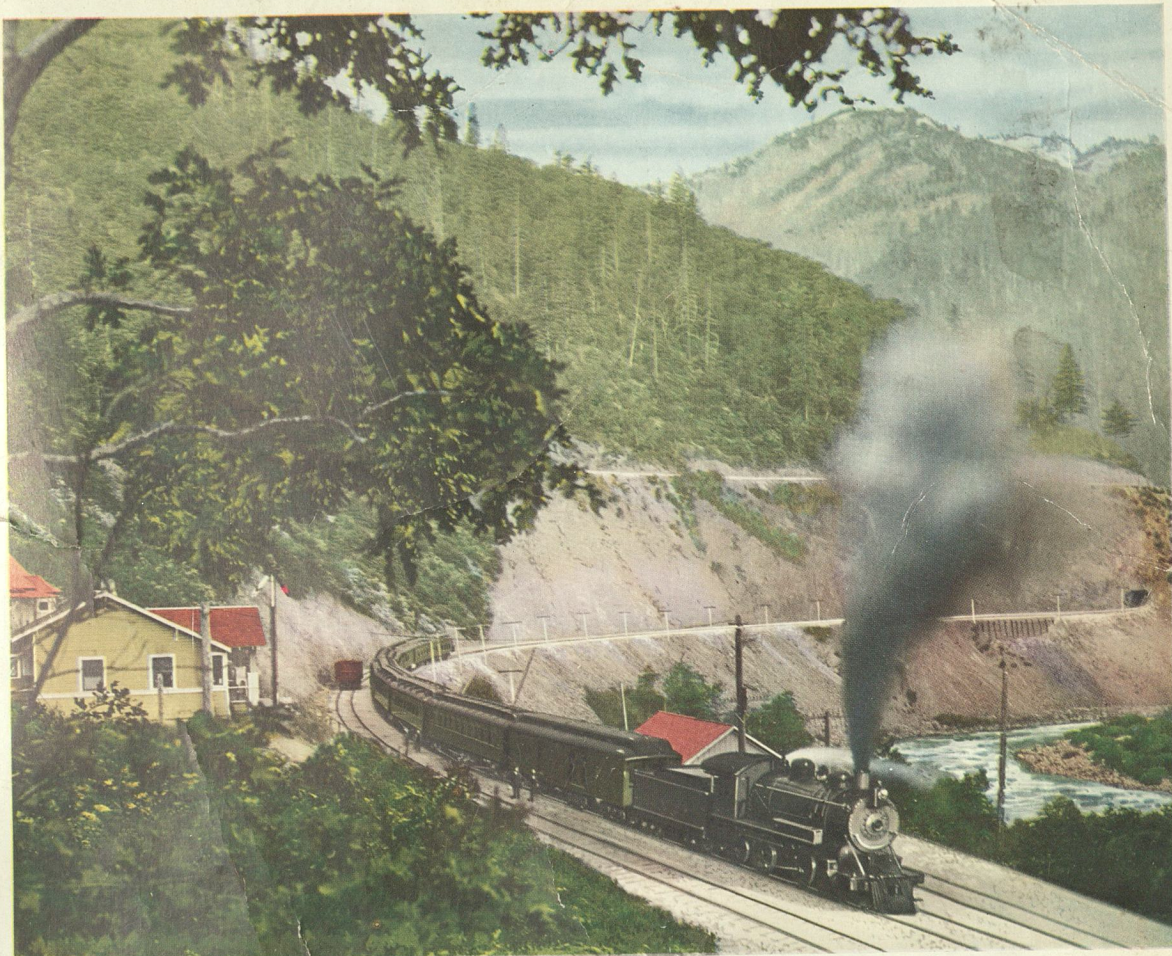
THE RAILROAD BRIDGE ABOVE THE NIAGARA RAPIDS

© Ewing Galloway

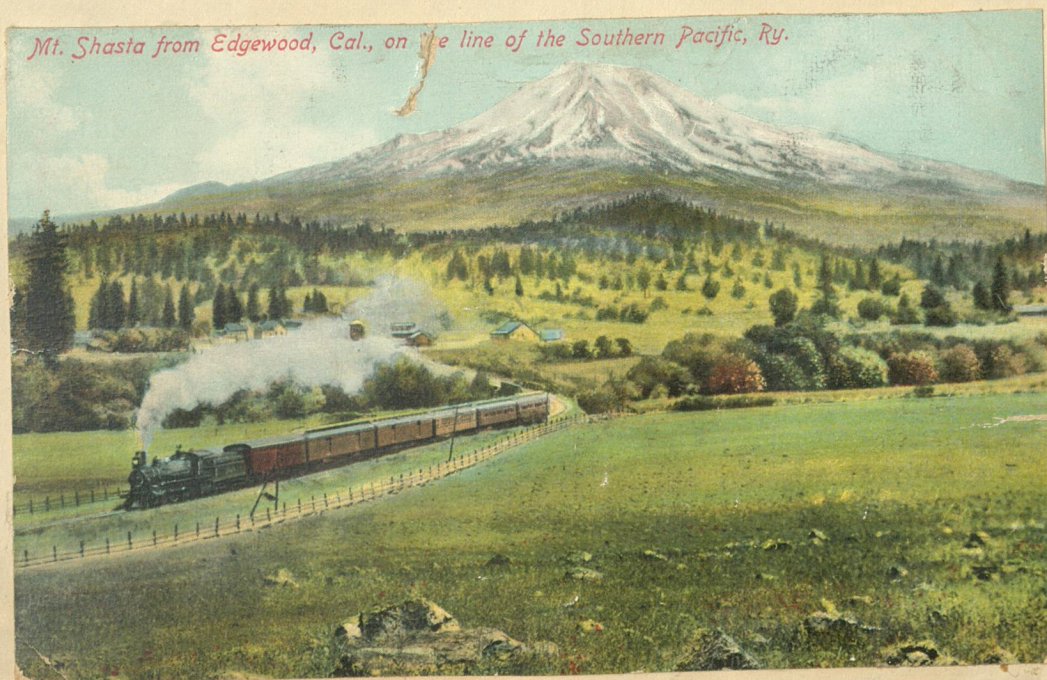


Photograph from Garnett King

BRIDGING A CANYON IN ARIZONA



12. Early Morning, Belden Station, Feather River Canon, California, Western Pacific Ry.

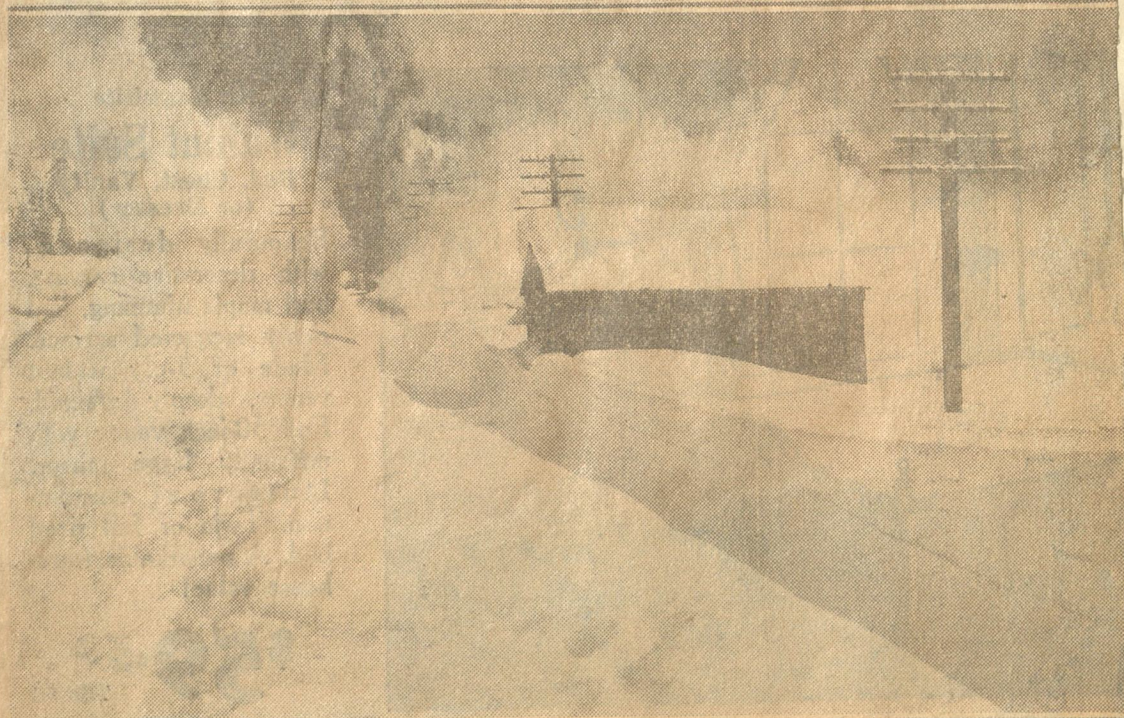
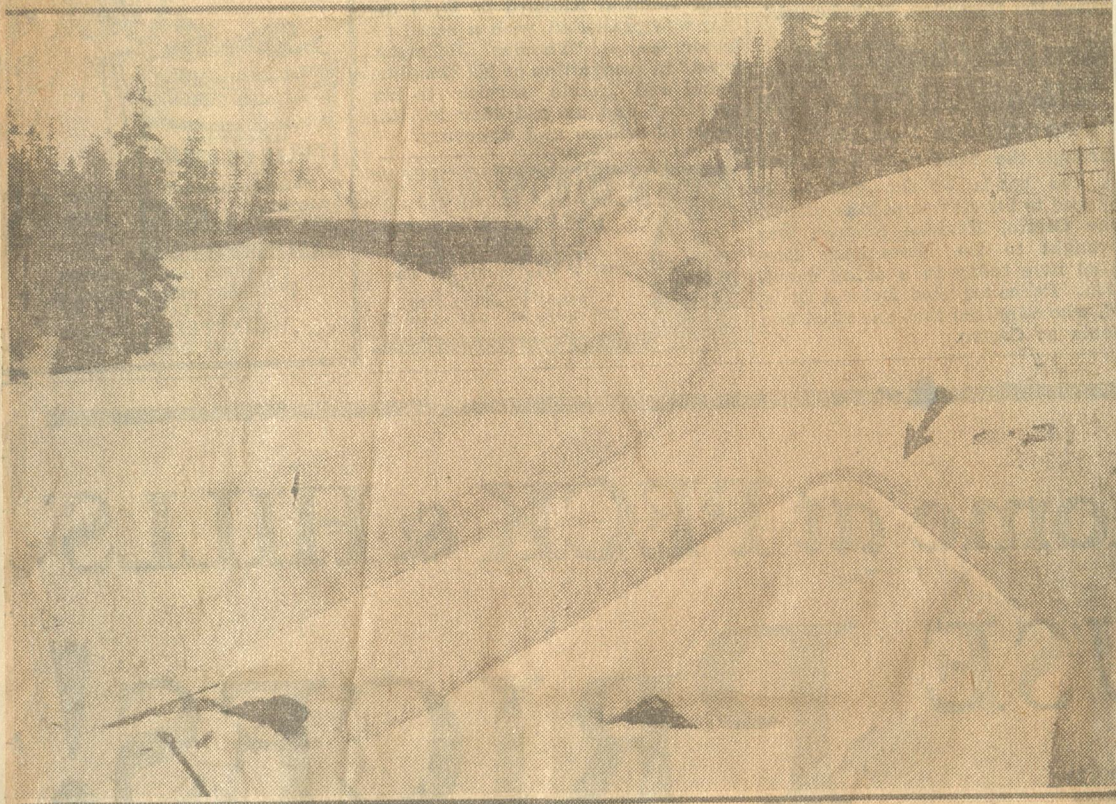


Mt. Shasta from Edgewood, Cal., on the line of the Southern Pacific, Ry.



1. Panama-Pacific Express Skirting the Shores of Great Salt Lake, Utah.

Fighting Through Sierra Drifts



THESE REMARKABLE photos of railroad snowplows clearing tracks in Sierra show } depth of drifts covering mountains. Note
arrow pointing to roof of buried house.

Safe Riding But Dangerous Walking

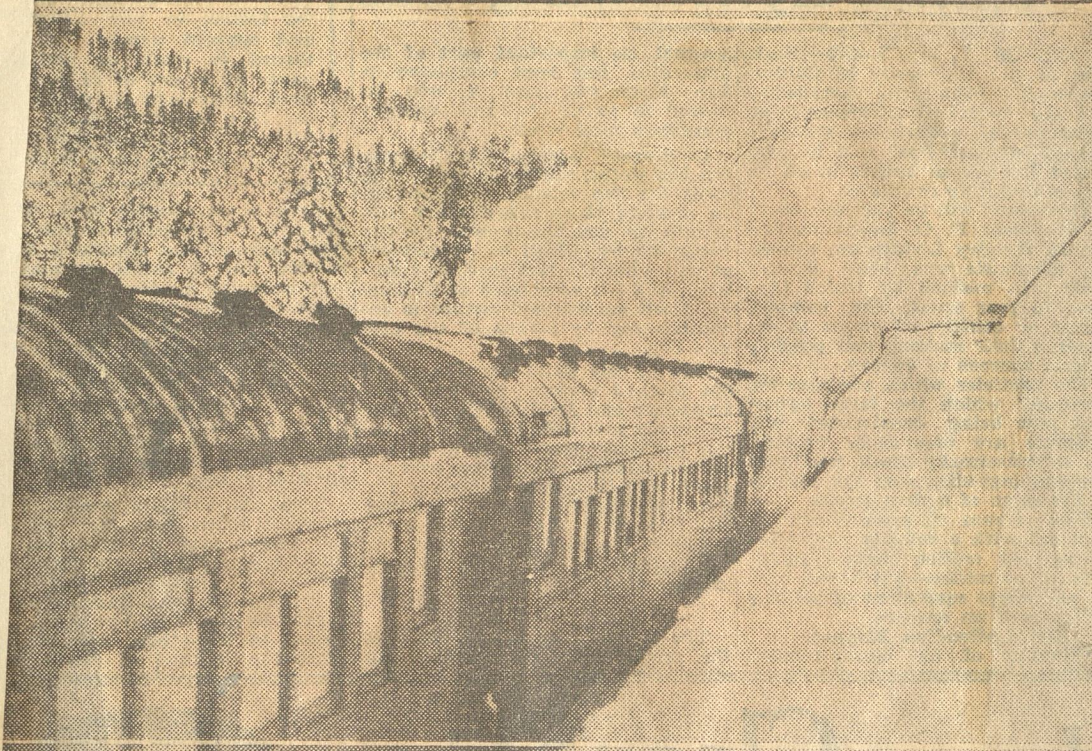


Photo by The Bee Cameraman

RAILROADS to-day are approaching the ultimate in safe transportation, but railroad men are warning that the rights-of-way are far from safe for pedestrians. Snow sport fans are especially warned to keep off the rails in the mountains, where to each side of the tracks a high bank is formed by the snowplows. Sometimes these banks run for great distances without a break. The above picture shows how little clearance there is between a train and the sidewall of snow.

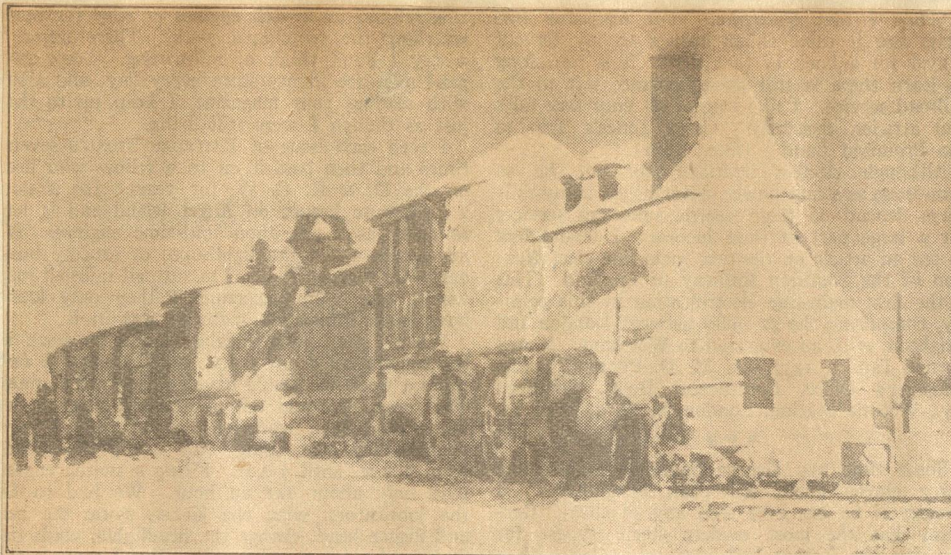


A ROTARY SNOW PLOW IN OPERATION

Clearing Snow From Echo Summit



Here are three views showing the state division of highways making the snow fly in the clearing of the Echo Summit on the Placerville-Lake Tahoe Highway late last week. The route is now open and in fair condition all the way, one of the earliest openings on record. The photos were supplied by the state division of highways.



From Collection of F. D. Reese, 16 Tompkins St., Cortland, N. Y.
Old-Time L.V. Doubleheader Flanging Snow near East Ithaca, N. Y. Who Can Supply Details?



Photograph by International

ICE-COVERED LOCOMOTIVES JUST IN FROM A WINTRY RUN

Running a big express is a nerve-straining occupation. Curves to be looked out for, signals to be watched, interpreted, and acted upon, and conditions of the track to be studied every minute, call for "a hand upon the throttle and an eye upon the rail" at all times. But when the driving storm, with its snow, or sleet, or rain, descends upon the right of way, the men who handle a train must call up the last ounce of their nerve and energy, if the precious cargo is to be brought to its journey's end without mishap. Eight million dollars is a hard winter's toll for driving from the railbeds of the United States the snowflakes that hinder traffic.



© National Geographic Society

Natural-Color Photograph by Jacob Gayer

HERE "IRON HORSES" STORM THE LAST RAMPARTS OF THE ANDES

This photograph was taken from Ticlio, one of the world's highest stations on a standard-gauge railway. The llamas grazing in the foreground are used for carrying copper ore from the small mines in the mountains to the railroad.



© National Geographic Society

Natural-Color Photographs by Jacob Gayer

AN AMERICAN LOCOMOTIVE ON THE ROOF OF THE NEW WORLD

The Central Railway of Peru was begun by a Californian and completed by a Virginian. From Lima to the summit of the Andes it passes through 61 tunnels and runs over 41 bridges.



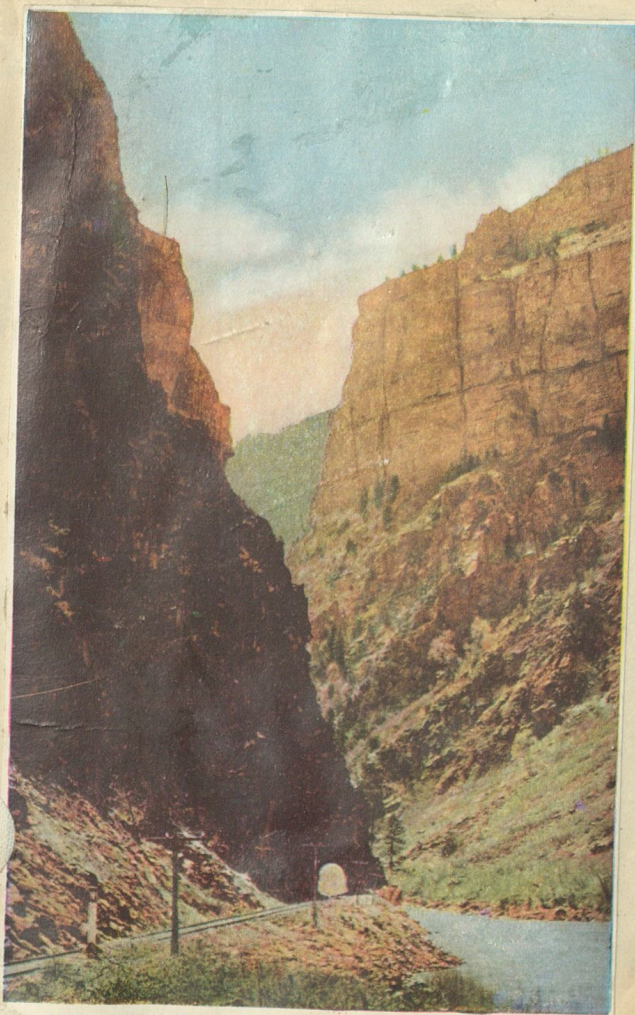
15. Three Tunnels, in Feather River Canon, California, Western Pacific Ry.



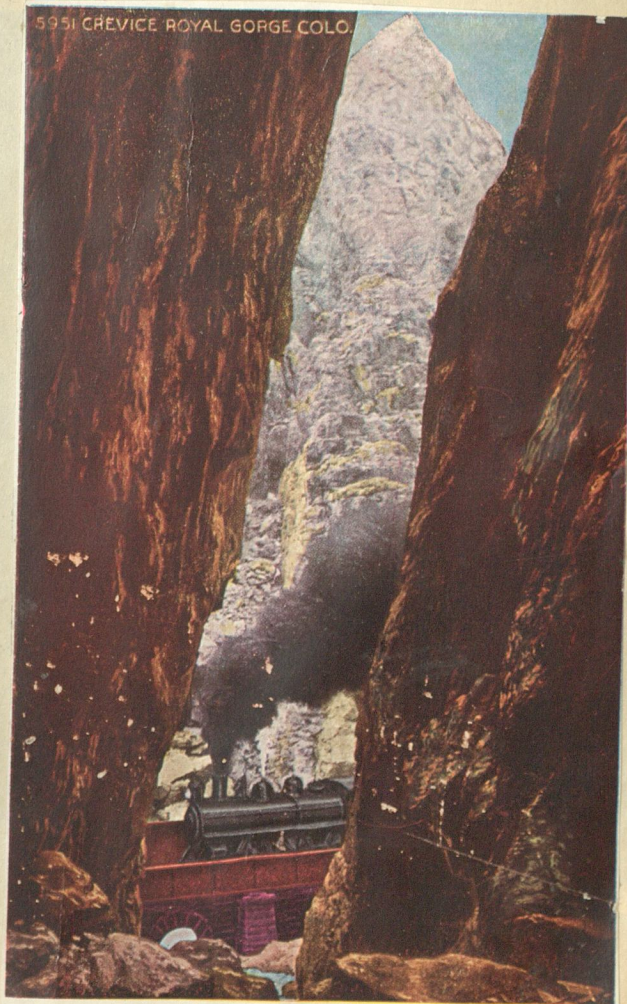
15449. Double Track, Eagle River Canon, Colorado



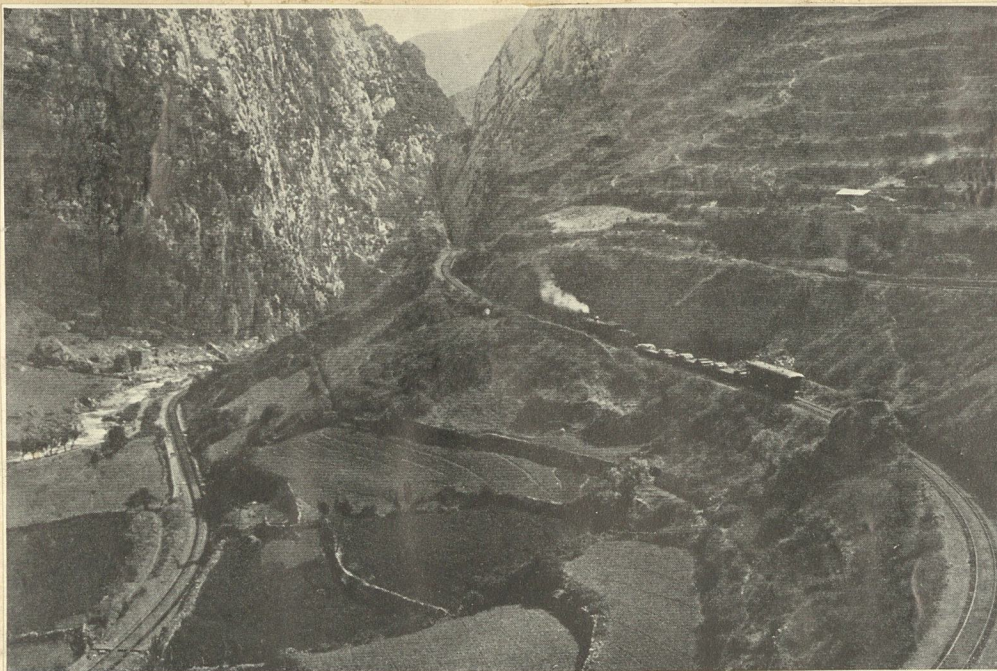
8. Castle Butte, Feather River Canon, Western Pacific Ry.



15452. Second Tunnel, Canon of the Colorado River, Colorado



5951. The Crevice, Royal Gorge, Colorado

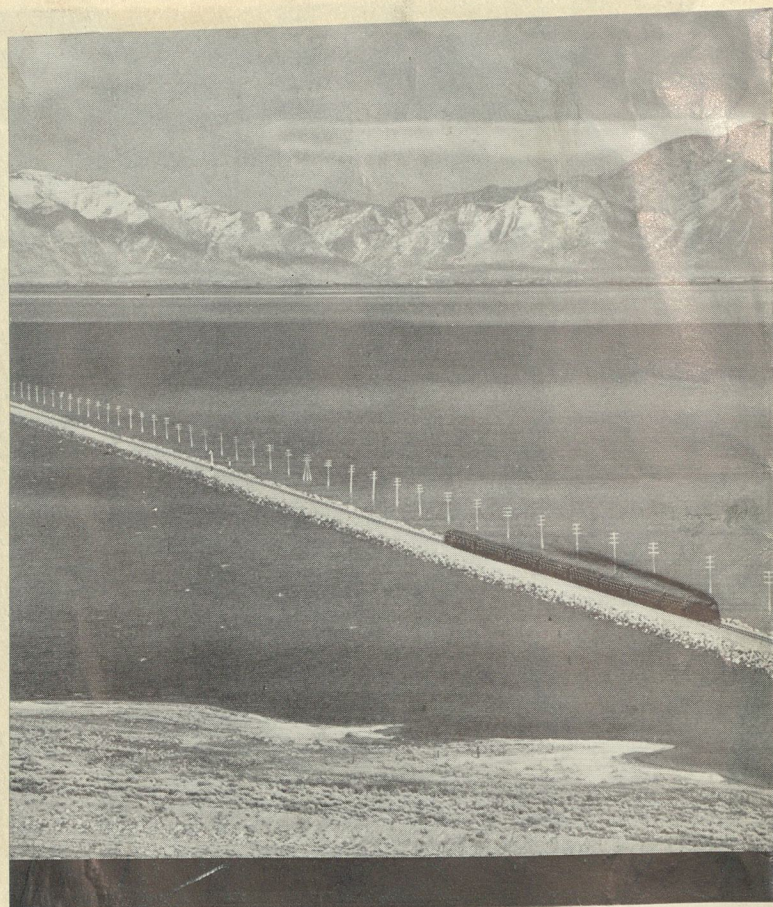


A SWITCHBACK SCENE IN THE ANDES

To the right of the center is a trainload of copper sheets and bars moving to the sea from Cerro de Pasco; in the upper right is a series of "staircase farms"; at the left is the Rio Blanco, and in the distance one of the scores of gorges through which Henry Meiggs built his railway.



4376. Moonlight in the Royal Gorge, Colorado



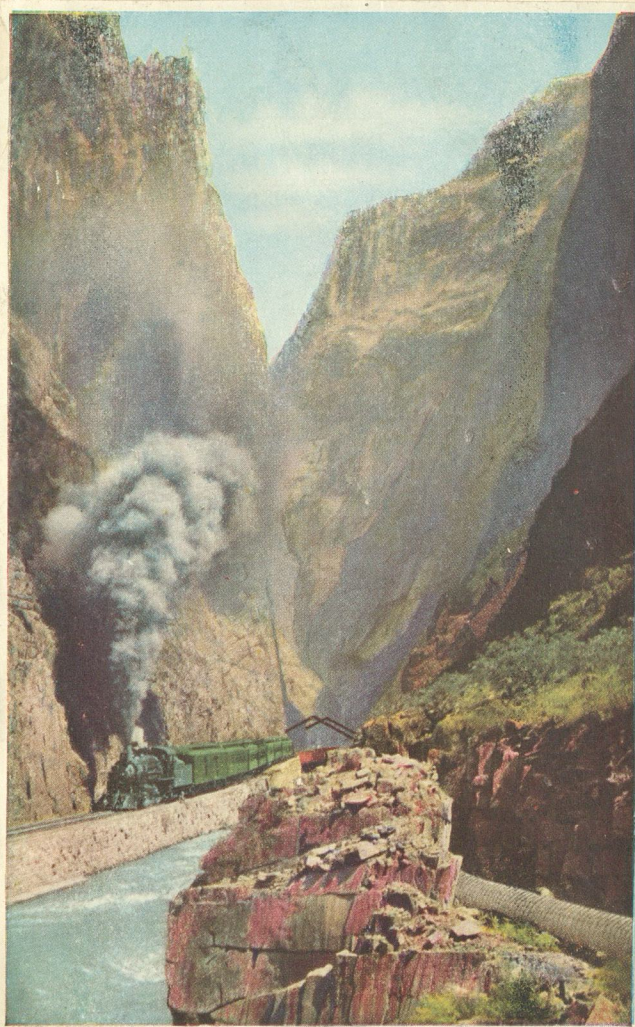
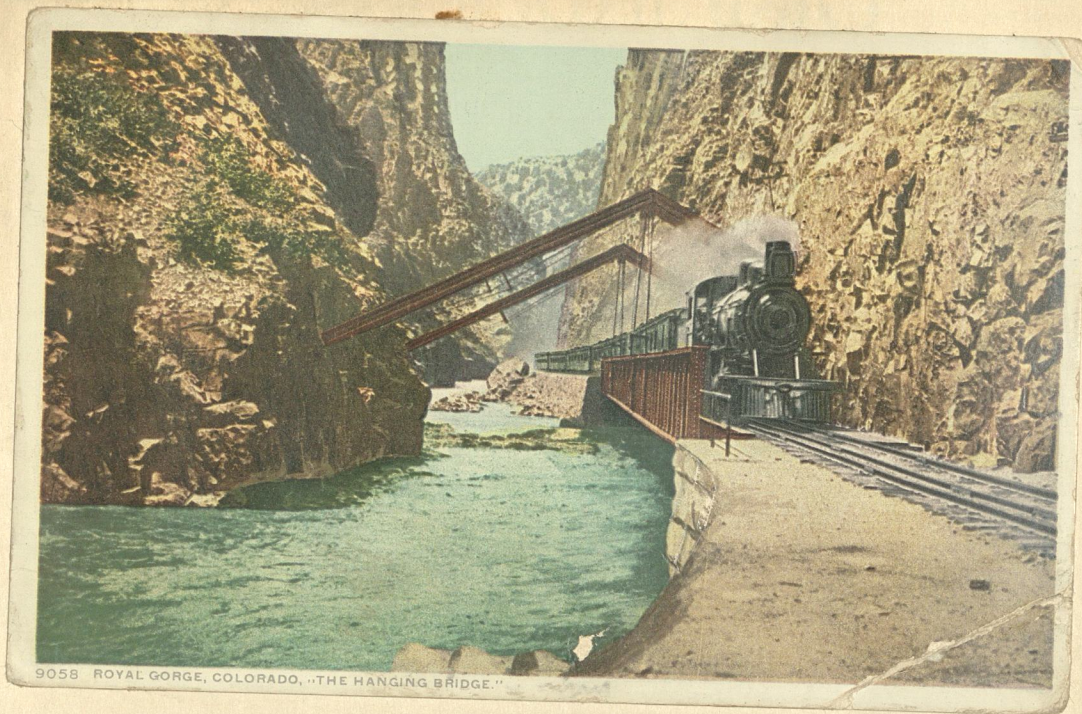
Crossing Great Salt Lake on our OVERLAND ROUTE



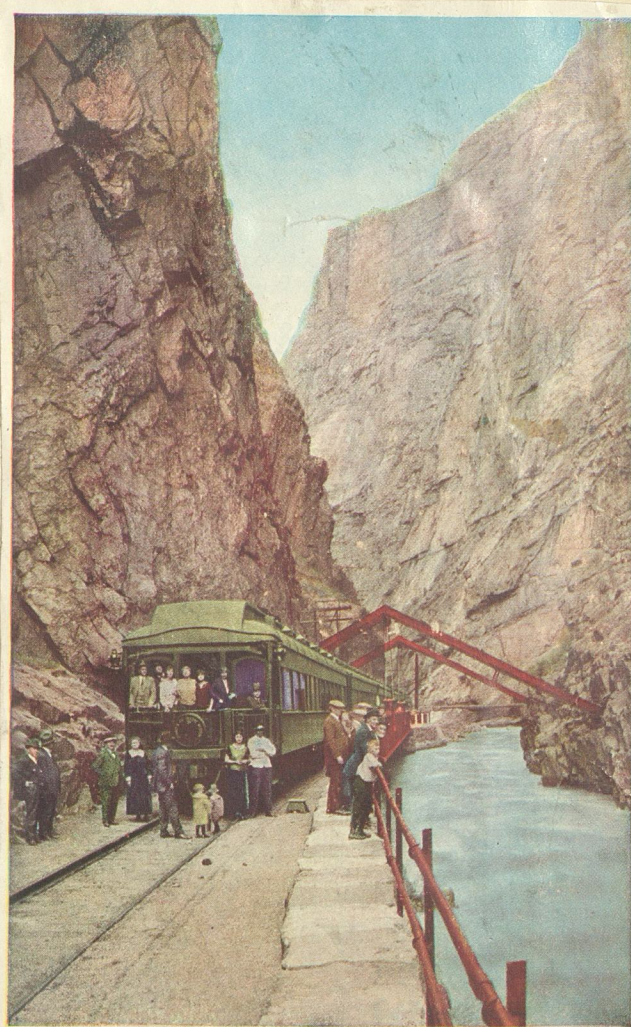
5. Williams Circle, California, Western Pacific Ry.



13. Train Leaving Long Tunnel, on Line of Western Pacific Ry.

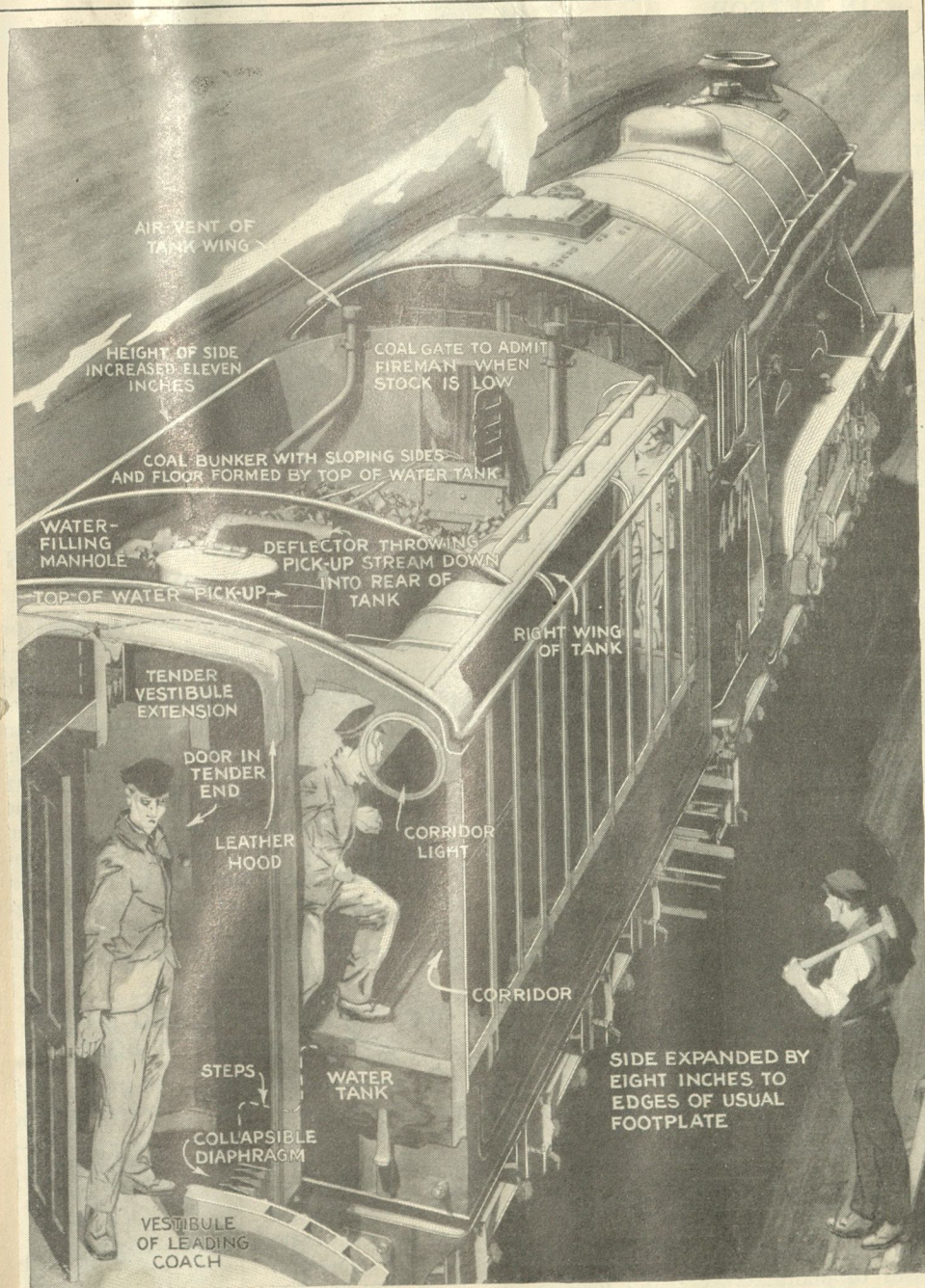


4427. Going Through the Royal Gorge, Colorado



4425. At the Hanging Bridge, Royal Gorge, Colorado

NON-STOP TRAIN CARRIES SPARE CREW IN COACH

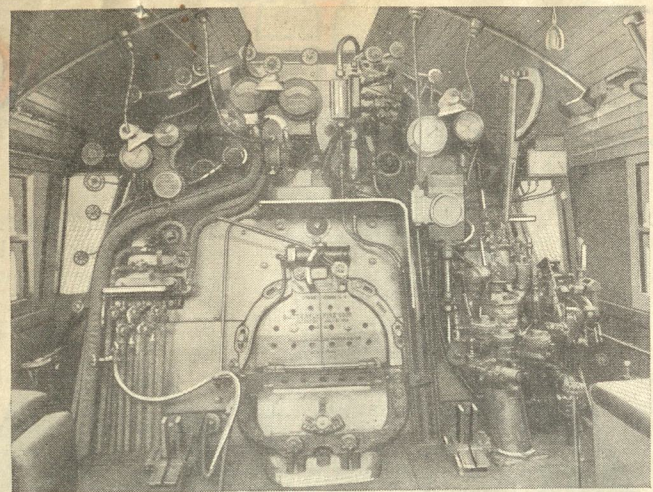


ENGLAND'S CRACK TRAIN TAKES NON-STOP RECORD

The famous "Flying Scotsman," the crack train between London and Edinburgh, recently lifted the world's non-stop-run record from another British railway, when it began running the 392 miles without a pause. Previously a stop had been made to change engine crews, the fast run being too much of a strain on one crew, though it is only eight and a quarter hours long. Elimination of the stop was made possible by building a special tender, with a corridor to connect the engine cab with a passenger compartment built into the first baggage car. The spare crew ride as passengers, and midway in the journey walk through the tender corridor, relieve the original crew, and the latter move back for lunch and rest. Despite the fact that it is a non-stop run, the running time of the Scotsman is not particularly fast, averaging 47.515 miles an hour. The New York Central's Twentieth Century, covering 960.6 miles in twenty hours, including time out for some ten stops, averages 48.03 miles, or more than half a mile an hour faster than the English train. There are several faster trains both in England and on the continent. The Great Western express from London to Exeter covers 173.7 miles in 175 minutes, or 59.55 miles an hour. The fastest train in the world is credited to France. The "Fleche d'Or," or "Golden Arrow," runs from Paris to Calais, 187 miles, at 60 miles an hour. Another French train, the "Etoile du Nord," or "North Star," runs from Paris to Brussels, 193 miles, at 56 miles an hour. The fastest trains in the United States are on the Pennsylvania's Philadelphia-Atlantic City line, making 59.7 miles in 65 minutes.

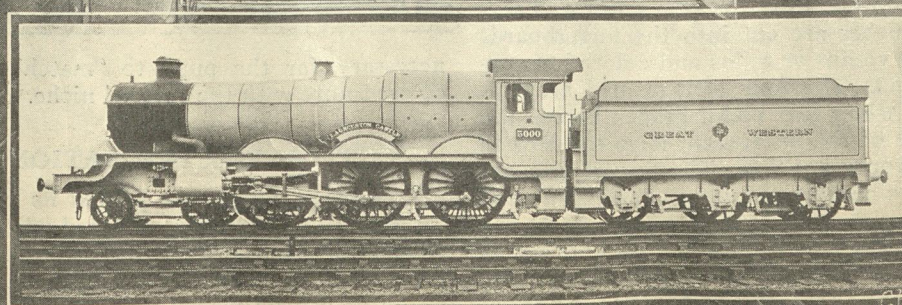
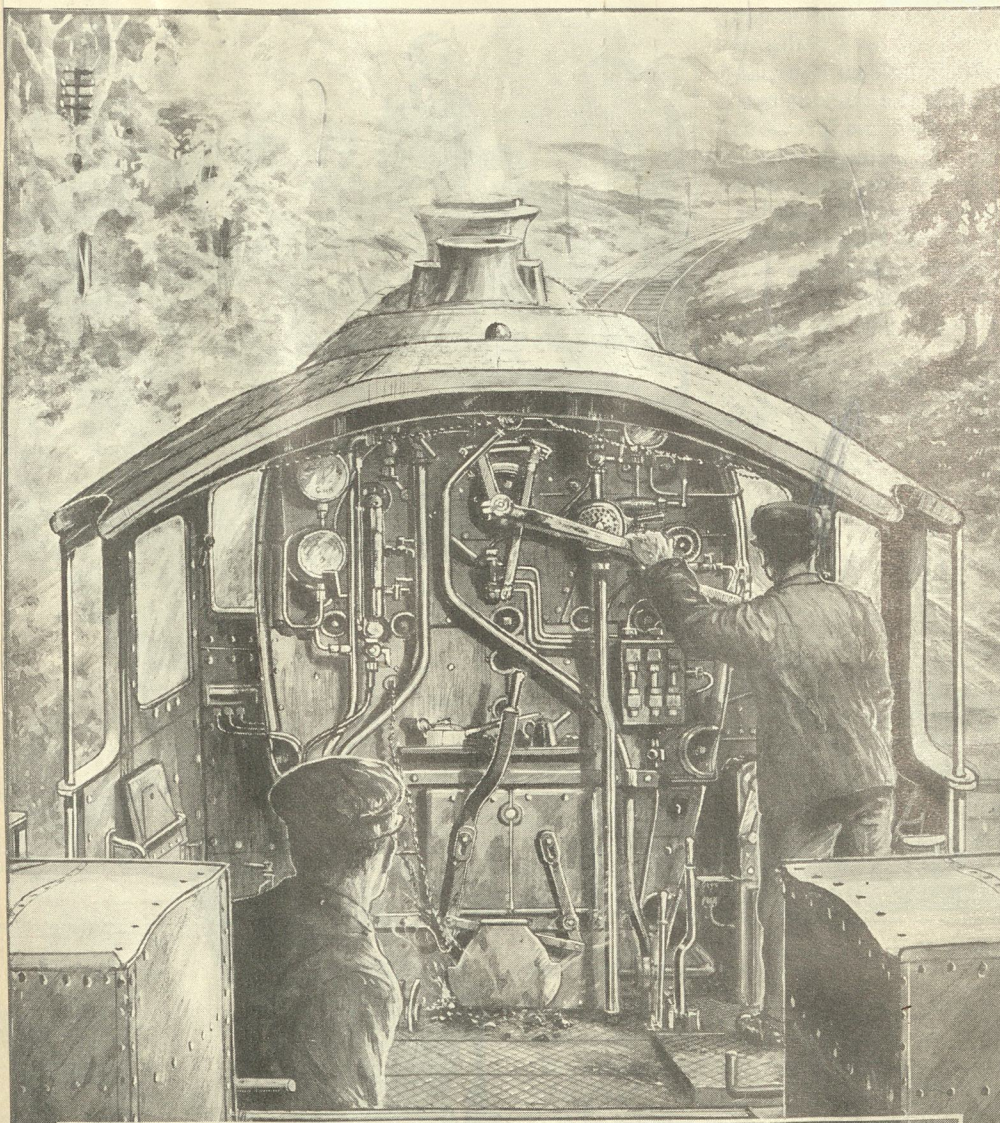
© S. W. Clatworthy

The Famous "Flying Scotsman," Which Runs from London to Edinburgh, Now Makes a 392-Mile Non-Stop Run between the Two Cities; Crews Are Changed Midway by Means of a Corridor through the Tender, the Spare Crew Riding as Passengers in a Baggage-Car Compartment



Interior of Cab of a Modern Locomotive That Is Almost Frictionless, Being Equipped Throughout with Roller Bearings

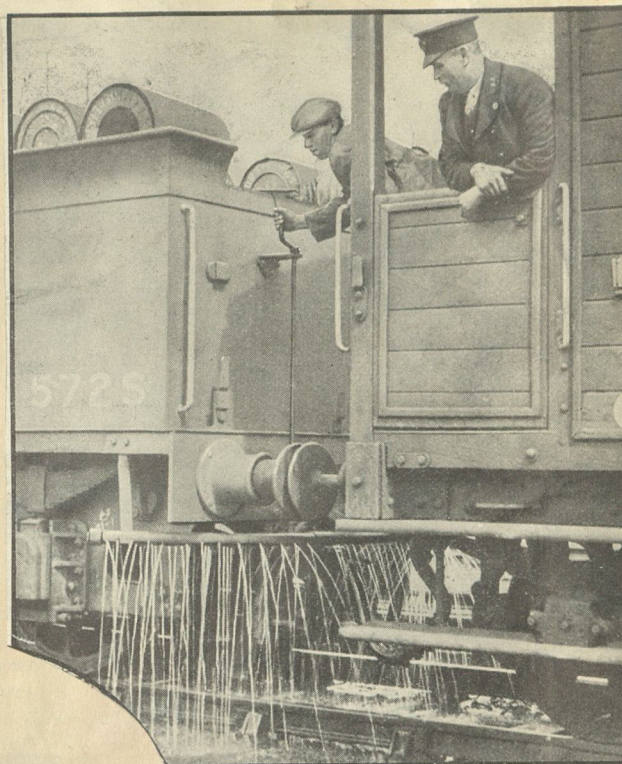
In the Cab of the World's Fastest Rail Flyer



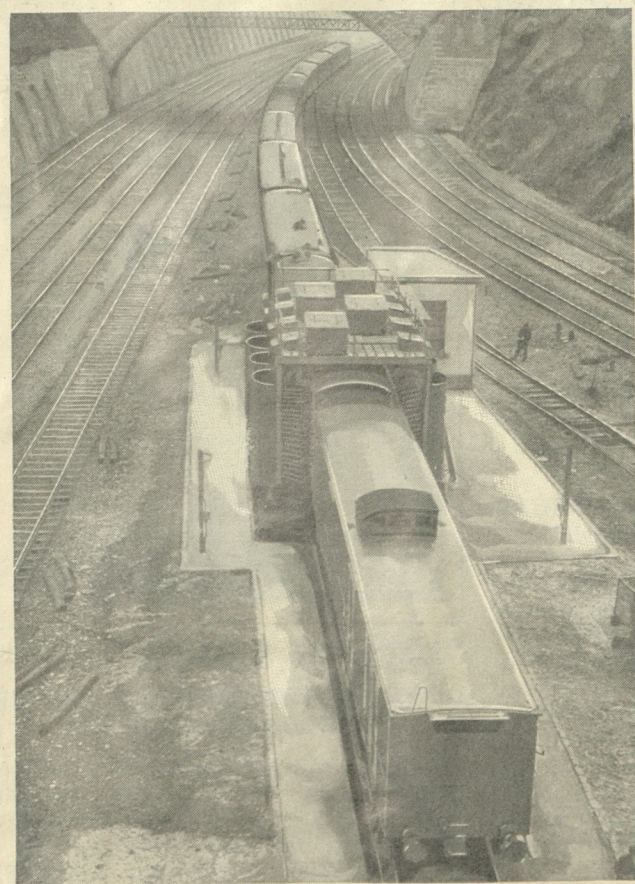
TRAIN CLEARS RAILROAD OF WEEDS



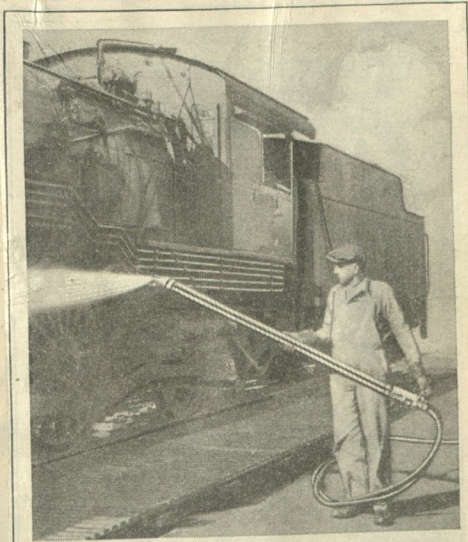
Keeping the Weeds in Check along the Railroad Right of Way; the Knives Reach Thirteen Feet on Either Side of the Track



England's new weed-killing train sprays a chemical solution over vegetable growth near track to destroy it so moisture can't gather



Cars in the Cleaning "Tunnel"; Brushes Wipe Sides and Windows, and Vacuums Help Remove Dust and Dirt

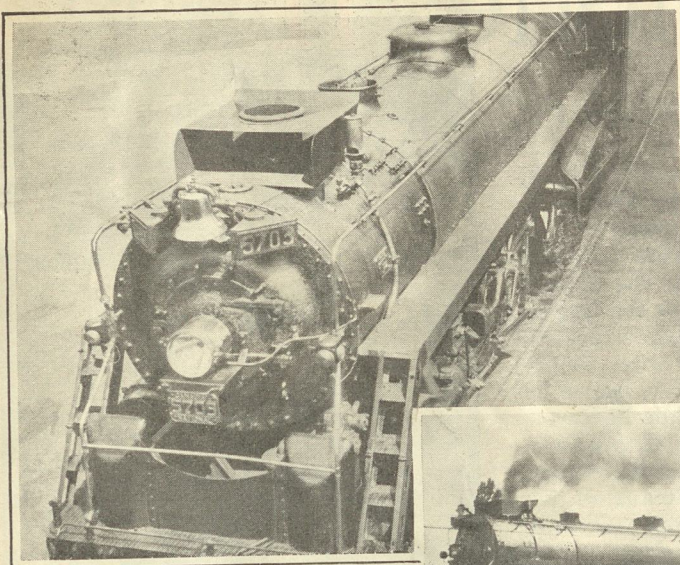


Giving the Iron Horse a Shower Bath; Hot Water and Oil under Air Pressure Are Being Used

SHOWER BATH FOR IRON HORSE COMBINES OIL AND WATER

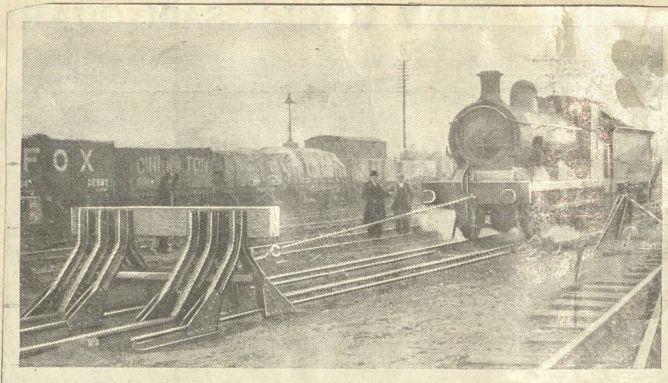
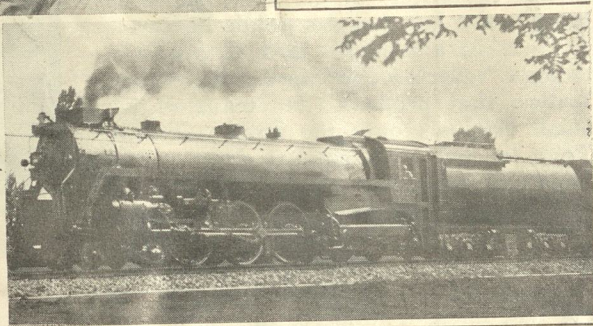
Railroad locomotives of one southern line are given a regular shower bath at the end of each run. A double hose is used for washing down the iron horse, hot water and oil being sprayed over the engine under heavy pressure. The process is completed in ten minutes, washing away all traces of grime from the journey.

Smoke Deflector Helps Crew of Locomotive



Locomotive Stack Equipped with Deflector to Force Smoke and Cinders into Air

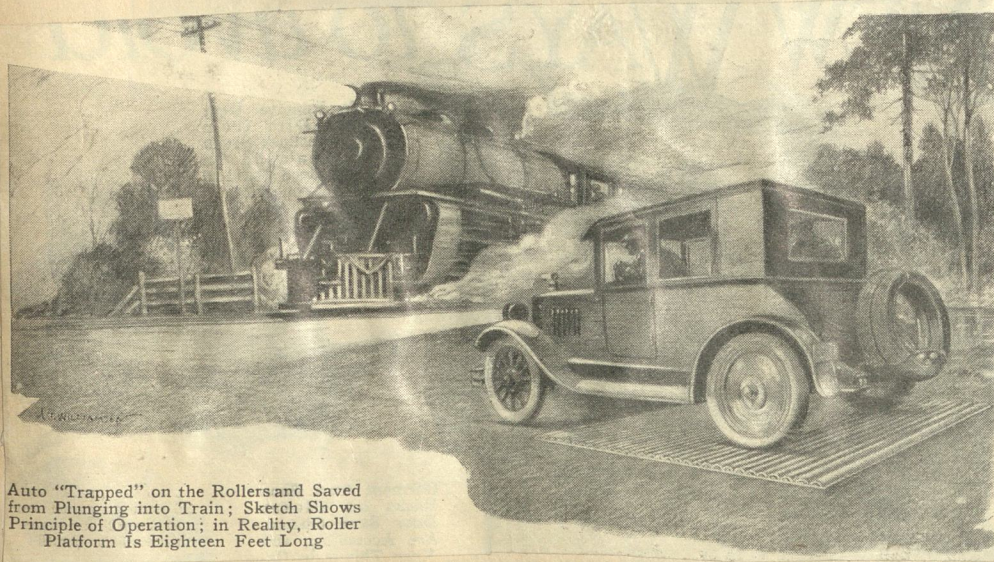
Smoke deflectors have been installed on locomotives of the Canadian National railway to improve the visibility for engine crews on fast trains. The deflector is placed about the engine stack, and forces smoke and cinders high into the air by creating a current which shoots upward at the rear of the stack. This not only removes smoke from the vicinity of the cab, but lifts it over the coaches behind.



Buffer Which Utilizes the Roadbed as a Brake When Struck, Being Pulled Back into Position After a Train Crashed into It

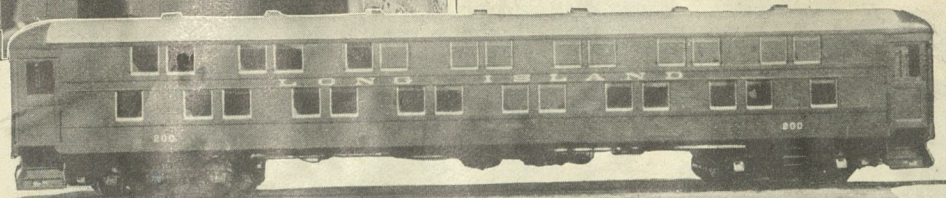
EARTH ACTS AS BRAKE TO STOP ROLLING LOCOMOTIVE

Great strength is combined with sufficient resilience to stop an engine and train without derailling it in an improved type of locomotive buffer recently tested in England. The heavy steel buffer rests on auxiliary rails inside and outside the main line. The metal parts are loosely connected so that, when the train strikes, the sleepers are pulled along, piling up the soil which acts as a brake. In the tests, a locomotive and train weighing 600 tons hit the buffer at eight miles an hour. It was moved back a distance of less than five feet but neither engine nor rolling stock was derailed or damaged.



Auto "Trapped" on the Rollers and Saved from Plunging into Train; Sketch Shows Principle of Operation; in Reality, Roller Platform Is Eighteen Feet Long

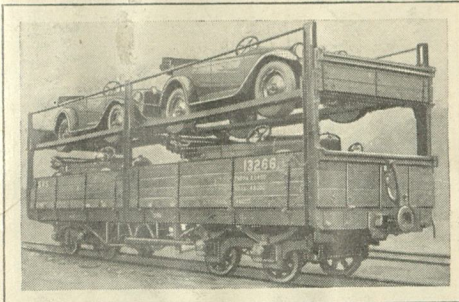
Double-Deck Trains Carry More Passengers



Double-Deck Railway Coach Which Seats 120 Passengers; It Contains One Center Aisle from Which Passengers Step Up or Down to Reach the Top or Lower Tiers of Seats

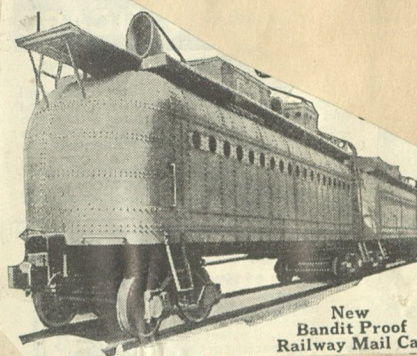
DOUBLE-DECKED RAILWAY CAR SPEEDS AUTO SHIPMENTS

To facilitate the shipment of automobiles in South Africa, a double-decked railway car has been introduced. It holds the cars securely in place to prevent dam-



Safe and Rapid Delivery of Motor Cars in South Africa Is Afforded with Double-Decked Railway Units

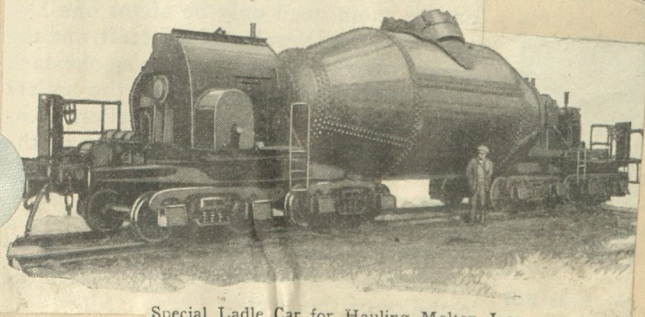
age while en route, is easily loaded and unloaded and reduces the train length.



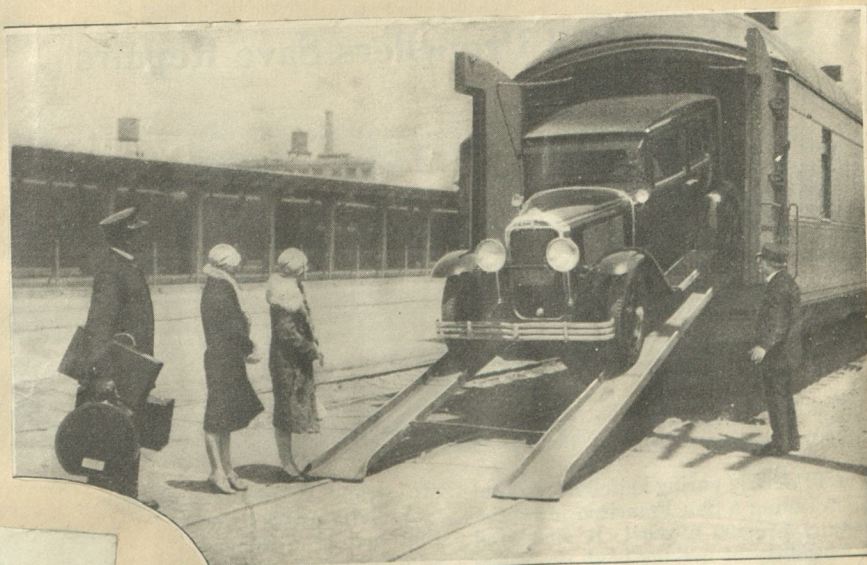
New
Bandit Proof
Railway Mail Car

VACUUM-BOTTLE FREIGHT CAR CARRIES MOLTEN METAL

Tons of molten iron are transported from furnaces to the rolling mills in Ohio, in big ladle cars that resemble giant vacuum bottles. They are lined with fire brick and fitted with lids somewhat like those of the familiar containers. To empty them, they are tilted by an electrically operated mechanism and the molten iron



Special Ladle Car for Hauling Molten Iron

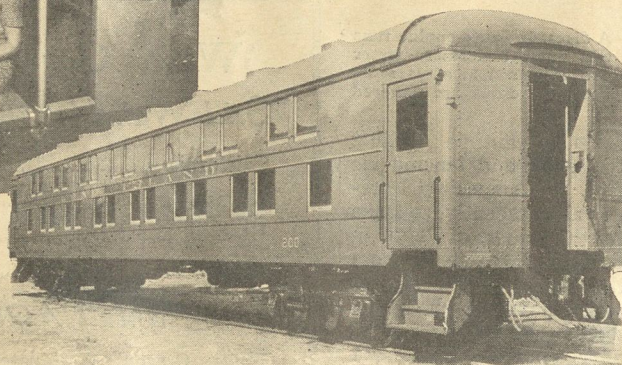


Autos Checked in Baggage Car

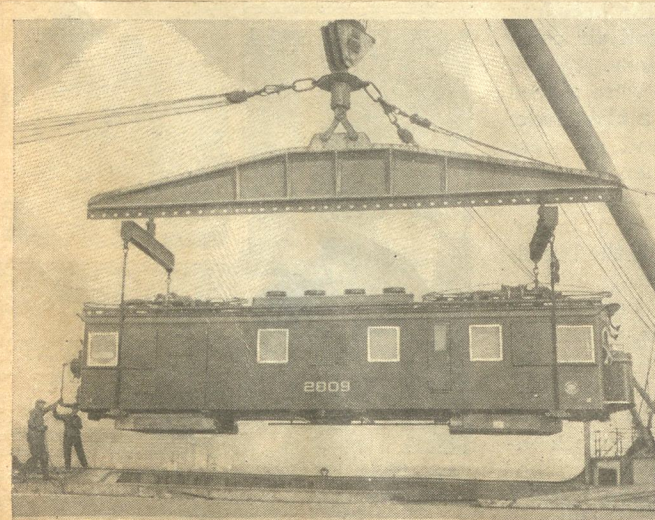
RAILWAY INSTALLS TWO-STORY CARS



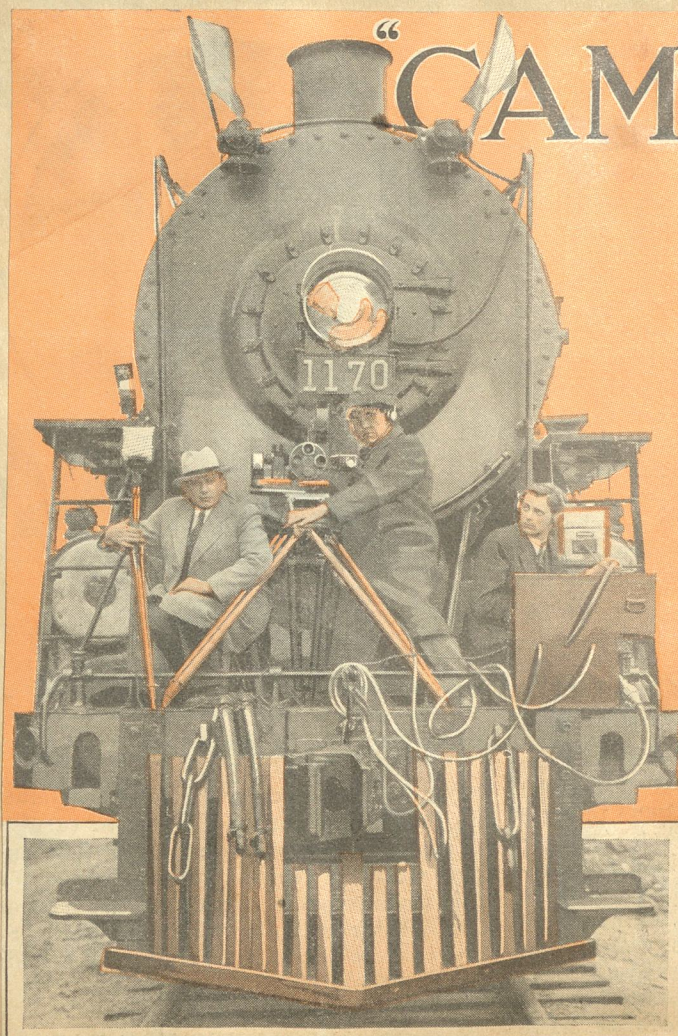
Right, exterior of new double-deck railway coach with two rows of windows and upper and lower row of seats. Above, close-up of the double tier of seats



DOUBLE-DECK coaches, an innovation in railway travel, were recently placed in service by the Long Island Railroad to carry commuters to and from New York City. The seats are arranged in upper and lower tiers. To reach a seat on either level, a passenger steps up or down from a single raised aisle running the length of the car. Because of the unusual seating plan, the new coaches accommodate 120 passengers. Substitution of the double-deck cars for the standard seventy-six-passenger coaches hitherto used is expected to relieve congestion at rush hours.



Electric Locomotive Being Swung Aboard Steamer for Shipment to Chile; This and Three Other Engines Were Ordered by Telephone



Shooting a Scene from the Pilot of a Locomotive, Just One of the Many Hazards Faced Daily by the Newsreel Cameraman

First Railroad In California Started Here

Sacramento Valley Line Was Forerunner Of Great System

What a story it was for the pioneer editors of California when they were privileged to announce plans for construction of the first railroad in this state!

That was eighty years ago, and in those days of riverboat and stage coach "rapid transit" the coming of the "iron horse" to the Golden West was hailed with the wildest enthusiasm.

How different the picture in 1932:
California Leader.

With the greatest system in the United States to-day, with rail lines serving all parts of the state, with river craft still plying the inland waterways and with airplanes dotting the sky, California is second to none in transportation.

But in 1852 it required real hardihood and great strength of purpose for a group of optimistic Californians, including the young Captain William T. Sherman, to formulate plans for a key railroad from Sacramento east and north along the foothills to tap the rich placer mining regions of the lower Sierra slopes.

Marysville Objective.

Marysville was to be the first objective, it is recorded, with later branches to Coloma and Nevada City, and possible extensions north toward Shasta and south via Stockton to San Francisco. Such a railroad, it was believed, would control all the interior trade of California, and with this in view a corporation was formed under the title "Sacramento Valley Railroad" and a quantity of stock was sold.

Seek Engineer.

Having organized a company, the promoters of the rail project needed a competent and experienced railroad engineer to carry out their plans, and after a reorganization of the corporation in 1853, Colonel Charles L. Wilson, president, was sent to New York to find such a man.

Quite unaware of what was taking place in far-off California, a young engineer named Theodore Dehone Judah was seeking to advance himself by earnest application of his talents to various engineering projects in the New England States. He had already achieved considerable success in bridge construction and railroad building and was eager for new undertakings.

Judah Recommended.

When Colonel Wilson arrived in New York early in 1854 he sought the advice of friends acquainted in engineering circles. Young Judah was recommended for the place and summoned to New York for an interview. Three days later Mrs. Judah received the following telegram: "Be home to-night; we sail for California April 2nd."

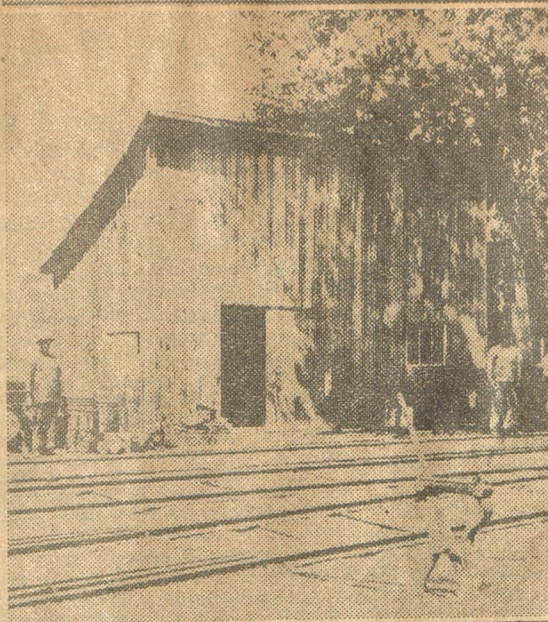
And so it came about that three weeks later they were on their way to the Golden West, traveling by the Nicaragua route.

Opens Office Here.

Reference to the records of the California Historical Society gives this continuation of the story:

Proceeding at once to Sacramento, Judah entered upon his new labors with characteristic energy, and was listed in the Sacramento

Who Can Remember These Rail Stations?



HERE are three old Sacramento railroad stations. The upper left-hand picture shows the first station and workshop erected on Front Street for the Sacramento Valley Railroad, the first in the state. On the upper right is the first Central Pacific Station on Front Street near K. Below is the old station at Second and G streets, which was replaced by the present Southern Pacific Station. Two old woodburners are waiting to pull out.

As soon as the location was completed to Negro Bar, Judah proceeded to obtain the right of way. Actual grading commenced February 12, 1855, and a week later 100 men were at work, with the prospect of a force of 500 within a short time.

Work Delayed.

By the time of the arrival of the first consignment of rails and rolling stock on the clipper ship Winged Racer in June, the grading was half completed to Negro Bar, but the financial troubles of this disastrous year delayed the work considerably.

On August 9th, however, the first rail was laid, and two days later Judah and other officials of the company carried a handcar to the tracks and took the first railroad ride in California—a distance of 400 feet.

Locomotive Arrives.

Soon the locomotive Sacramento was landed on the levee, and on August 17th a trial trip to Seventeenth Street was made, while on August 19th a delegation from San Francisco was taken for a thrilling but dusty ride to the terminus of construction.

By January 1, 1856, the line was in operation to Alder Creek, eighteen miles from Sacramento, and receipts were averaging "upwards of \$200 daily." The bridge over the creek being soon completed, it took but a few more days to finish the line four miles farther to Folsom, which was reached early in February and was the scene of a grand opening celebration.

City Directory of 1854 as "chief engineer" of the Sacramento Valley Railroad, with offices in the Hastings Building, second floor. (This building stood on the southwest corner of Second and J streets.)

Rolling Stock Bought.

While in the east, Colonel Wilson had made arrangements for the purchase of materials and rolling stock, and under Judah's direction a preliminary survey of the road was begun immediately. On May 30, 1854, the chief engineer reported that he found the line to Mormon Island more favorable than any he had ever run before, with no deep cutting to be done nor any high embankments to be constructed, and that the grade was almost as regular and uniform as an inclined plane.

It was estimated that the cost would be \$33,000 per mile, including everything necessary to place the road in complete running order, with proper rolling stock, and the further comment was made that the cost of operating the line probably would be about three times the amount required in the Atlantic States.

Profits Predicted.

Counts of freight and passengers actually moved by team or stage over certain selected routes were included, such data being at the time considered a proper basis for estimating the probable earnings of

a railroad project in a new country where no actual railroad experience was available, and the report concluded: "With such a road and such a business, it is difficult to conceive of a more profitable undertaking," while the press declared:

"Everything promises favorably and the engineers are going forward immediately to determine the absolute locality of the line with a view of placing it in a short time in a position to advertise for the letting of contracts."

Location Surveyed.

The location was rapidly surveyed and staked. By June 20th the surveyors had reached Alder Creek, eighteen miles out, and Judah proposed to cross the American River at a point just above Negro Bar, near certain large "leads" of the finest building granite.

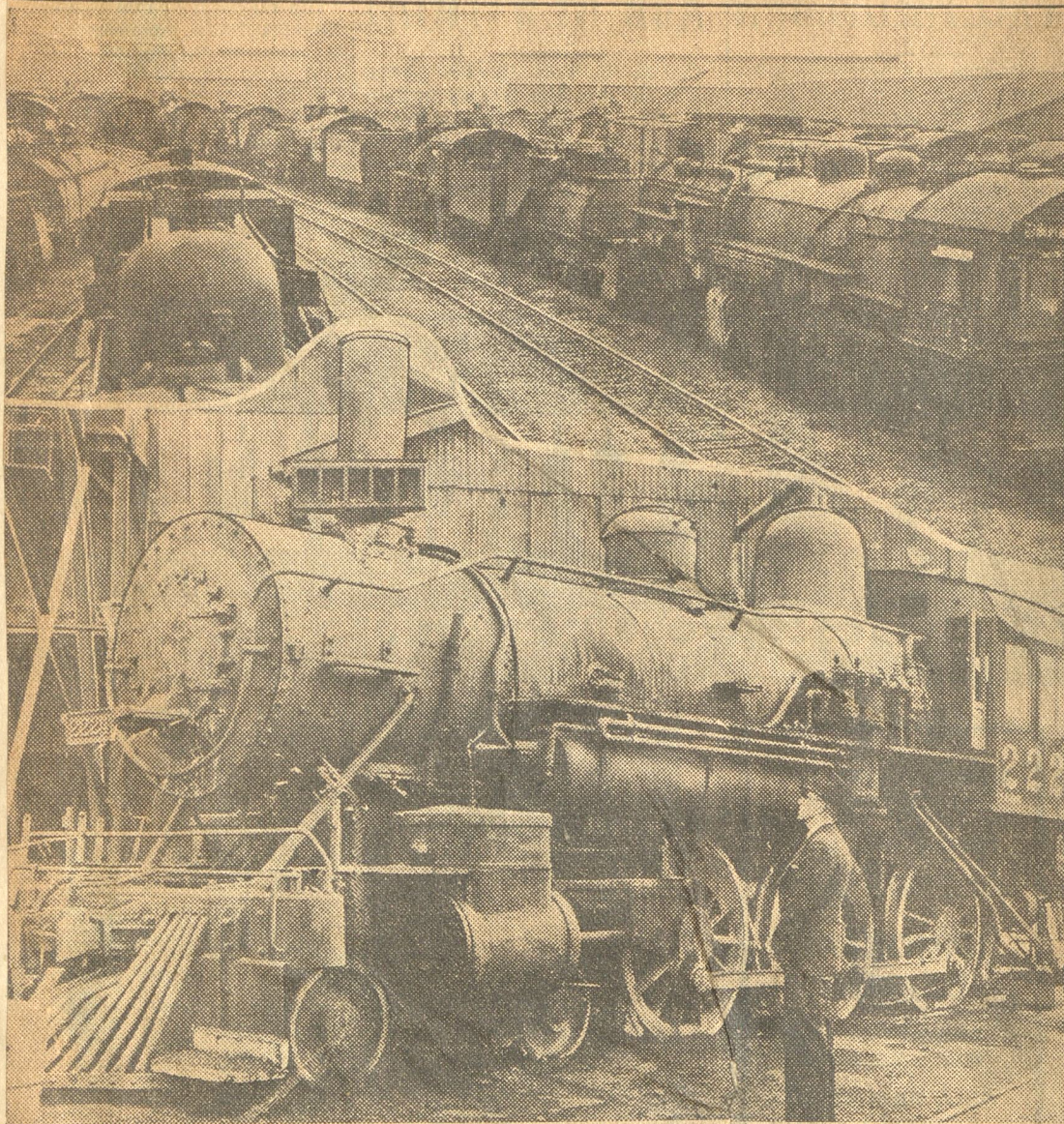
On November 24, 1854, the well-known eastern firm of railroad contractors, Robinson, Seymour & Co. signed a contract to furnish all things necessary to put the project in proper running condition, including rails, rolling stock and buildings, for the total sum of \$1,800,000.

Cost \$45,000 Per Mile.

This meant a total cost to the company of \$45,000 per mile, which tallied closely with Judah's re-estimate that the costs on the first division of twenty miles would total \$870,000, or \$43,500 per mile.

1201 K St.
Sears, Roebuck & Co.

The Graveyard Of Iron Horses



Their whistles stilled and their boilers cold, these mighty Iron Horses which fascinated another generation now are at the end of their run. The photo at the top shows a section of the Southern Pacific's graveyard in Sacramen-

to, where the locomotives await cremation in white hot furnaces. Below, however, is No. 2224, the oldest of the lot, which refused to quit when the perilous age of 40 was reached. No. 2224 is used as a stationary steam engine.

Bee Photos

Thirty-Four Engines Await Furnace Doom In Boneyard

By BRADLEY RITER.

The Bone Yard—the Potter's Field of forgotten monarchs.

There, in a section of the Southern Pacific yards, once proud and mighty Iron Horses are at the end of the trail.

Thirty-four huge hulks of iron and steel rest there. Some have wide gashes in their rust encrusted sides. Others are stripped of the massive "eyes," which once flashed through the blackness of night as the locomotives carried human cargoes to their goals.

Still others stand like night-mares, shorn of resonant, shrill toned whistles and their once shining, black smokestacks.

Bones of steel—a pitiful scrap heap of monsters awaiting their cremation in white hot furnaces which will transform them into molten metal for refabrication into something else.

Forty Years Old.

A short distance away, however, is the oldest Iron Horse of them all—a locomotive that refused to quit—refused to be pensioned after many long years of faithful performance.

She is No. 2224.

Forty years ago, the Cook Locomotive Works of Trenton, N. J., gave her to the world. She marked an epochal advance in transportation, weighing 142,350 pounds and costing \$10,000. Mighty, then, but a pygmy to-day alongside of the AC-6, the Southern Pacific's newest which weighs 932,900 pounds and cost \$140,000.

Met Challenge.

No. 2224 met conditions from the start by pulling the limited over the hump from Sacramento to Wadsworth, Nev. She did it conscientiously and without a hitch, meeting the challenge of her day.

But Time and Progress hurled their challenges, too incessantly.

Wooden passenger coaches were replaced by steel cars and No. 2224 was found wanting. She generated as much power as ever—but not enough. So she was demoted and given the task of pulling light loads down the river and to Placerville. Faithfully she struggled against the overpowering ravages of age and time.

And then, No. 2224 was found unable to perform even these menial tasks. Her giant wheels stood still—after running 15,000,000 miles, a distance equivalent to 600 trips around the world.

No. 2224 found herself on the outskirts of the Bone Yard.

Her bell was sold to a rancher who used it to call his hands to dinner.

Life after 40—what?

No. 2224 refused to quit.

Stationary Engine.

So they decided to give her another chance. They took her to another part of the Southern Pacific yards where she no longer can see the ever-changing vistas

that open up along the ribbons of steel. No. 2224, to-day, sees only the four grimy walls of a room, for she is a stationary steam engine.

But No. 2224 is happy—very, very happy.

While there is life there is hope, she thought.

To her, at least, life begins at 40.



Observation Car of President Harrison (Seated at the Right),
in the Year 1891



Each Car on the New Eighth Avenue Subway Has Seats for 60 Passengers and Standing Room for 220

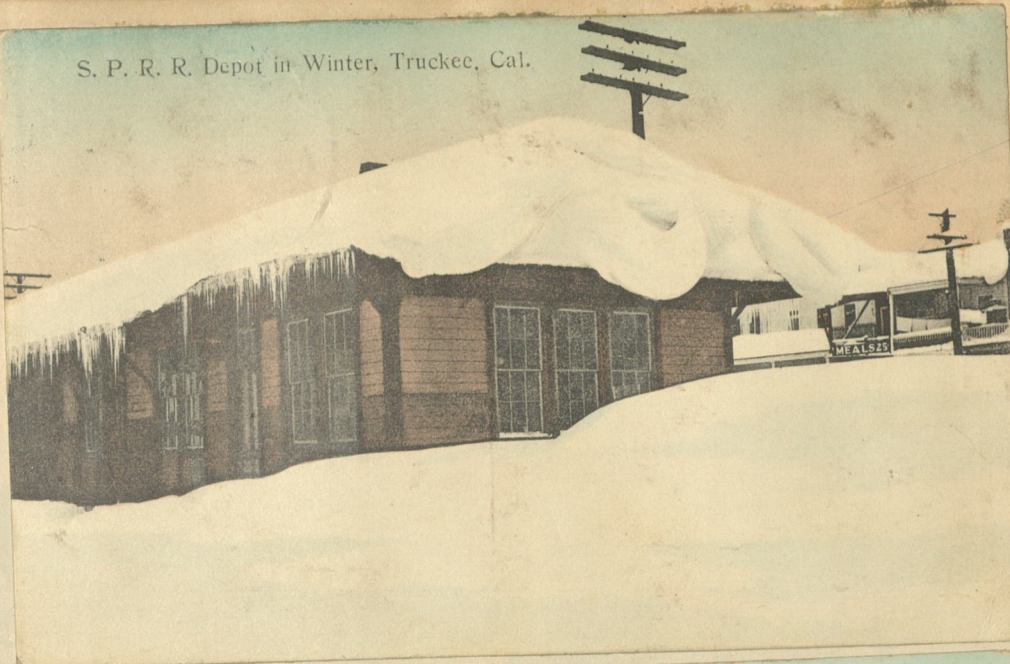


Uniformity of design in exterior decoration has marched hand in hand with diversity of design and colour in interior equipment. This view shows a typical ROYAL SCOT First-class compartment.

This Spring, the newest and most luxurious of railroad passenger equipment enters service of the **North Coast Limiteds** for the satisfaction of travelers between Chicago and the Northern Pacific Coast.



S. P. R. R. Depot in Winter, Truckee, Cal.



825 - UNION DEPOT, SEATTLE, WASHINGTON.



SOUTHERN PACIFIC DEPOT, SACRAMENTO, CALIFORNIA

108905



Sacramento has assumed even greater importance as a transportation center by reason of the Western Pacific-Great Northern tie-in. In the picture, one of the Western Pacific's Salt Lake-San Francisco trains is at the moment of departure for Stockton and the Bay cities. Soon the Great Northern's crack train, the "Empire Builder," will be rolling through this station of the Western Pacific, at Nineteenth-Twentieth, J and K Streets. Freight trains of the two transcontinental systems are already in operation over these tracks.



Where rail meets the great Sacramento valley waterway. This view of the waterfront shows the railroad freight sheds on the right and the steamer sheds on the left. Freight of tremendous value moves through these sheds daily.



Inter-city train service is maintained by the Sacramento Northern Railroad, which runs from Sacramento north to Chico, Colusa, and Oroville, and south to San Francisco. The Sacramento station also is used by the Central California Traction Company, which connects with the Santa Fe at Stockton. The station is at Eleventh and Twelfth, H and I. A freight depot is maintained at Second and M.



Sacramento's Southern Pacific Station at Fifth and I Streets, one of the busiest passenger terminals west of Chicago. Every modern facility has been installed for the convenience of the traveler. At the extreme right may be seen a section of the terminal post office building, which also houses the express office. The station faces an attractively landscaped city park. This was a \$2,317,000 project.



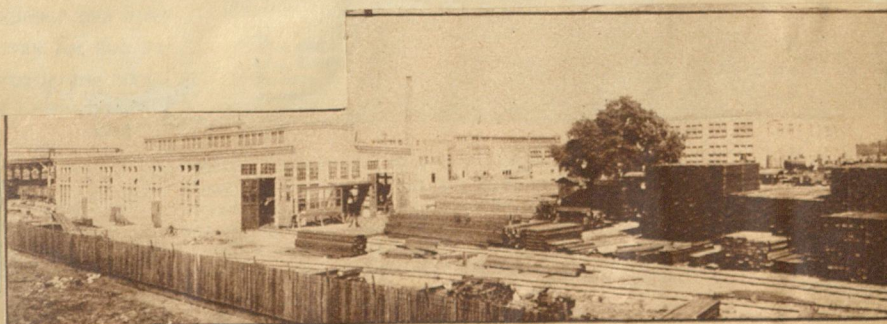
An idea of the importance of Sacramento as a transportation center may be gained from this aerial view of the Southern Pacific shops, the largest west of Chicago. Here locomotives and cars are built and repaired.



Big Railroad Yards Brilliantly Illuminated with Powerful Searchlights to Aid Night Work; Forty-Five Reflectors Are Used

LIGHT SYSTEM IN FREIGHT YARD TURNS NIGHT INTO DAY

By means of forty-five electric searchlights which are turned on and off by automatic time switches, the three-and-one-half-mile freight terminal of the Illinois Central railroad near Chicago is brilliantly illuminated for night operations. The projectors are so set that glare is eliminated and equal distribution of light is achieved. There are 125 tracks and 11,500,000 square feet of ground in the area.



Two transcontinental railways have their main shops in Sacramento. This is a section of Jeffrey shops of the Western Pacific. These shops will, doubtless, do the work of the Great Northern, which will inaugurate passenger service from St. Paul to San Francisco, via Sacramento, in May of this year.

Man Markets his Wares

WHEN you sit down to breakfast you are in touch with every quarter of the world. Your fruit may have come from California, Florida, Delaware or Spain; your coffee from Brazil; your cereal from the middle western prairies; the sugar from Cuba; the chinaware from England; you read a paper made from pulp produced in Canada, and therein see a picture sent by wire from San Francisco; your toast is made on an electric toaster which contains a bit of platinum from Russia and is insulated with rubber from the Malay Peninsula; meanwhile you are kept warm with coal from Pennsylvania; and you eat off a table for which the mahogany comes from Central America imported by a man in Michigan. If you were to trace back the sources of the materials used to make those products you would find yourself connected with every country in the world.

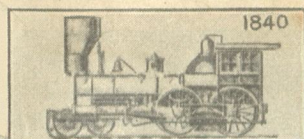
Transportation that moves products from the places where they are produced to places where they are used is the keynote of commerce.

Thus, commerce makes it possible for us to use the products of industry. Because Science has brought every country nearer to us by wire, by canals that make short cuts, by radio—we find that our modern environment is really a reflection of the whole world!

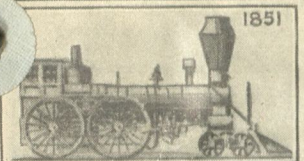
Look at a great railroad freight yard. There you will see cars from every part of the continent. One from the Southern Pacific may contain fruit; another from the Grand Trunk may carry rolls of paper; while a car from New England has bales of woolen goods. These cars gliding by each other suggest the kaleidoscope of commerce through which we are able to have the materials of our daily lives.



The universal traffic of man's wares is revealed in the vast yards of the great railroad centers.



1840



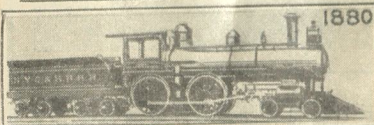
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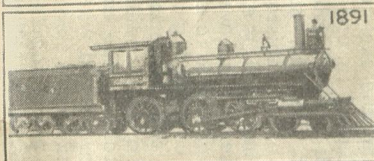
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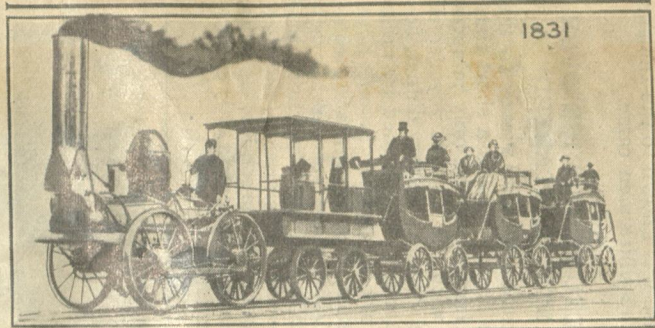
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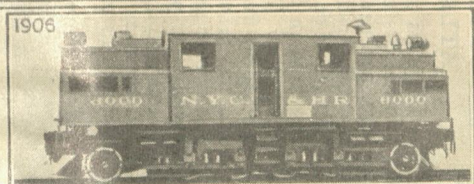
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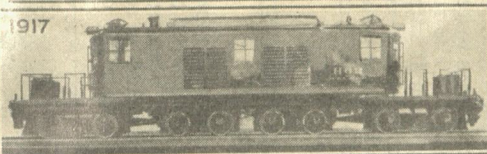
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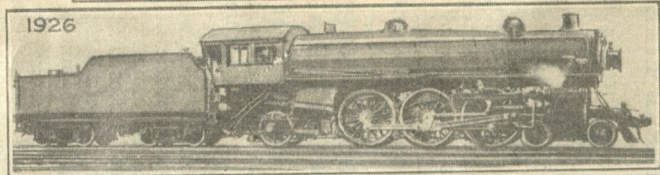
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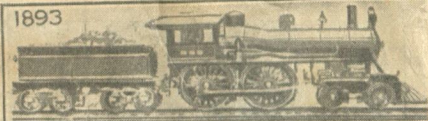
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1917



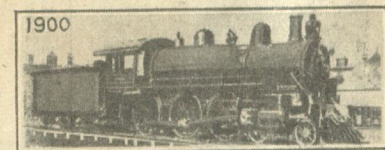
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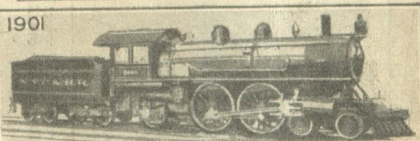
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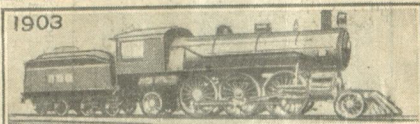
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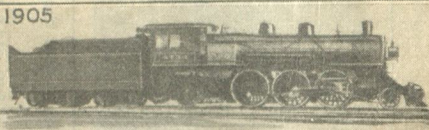
1900



1901

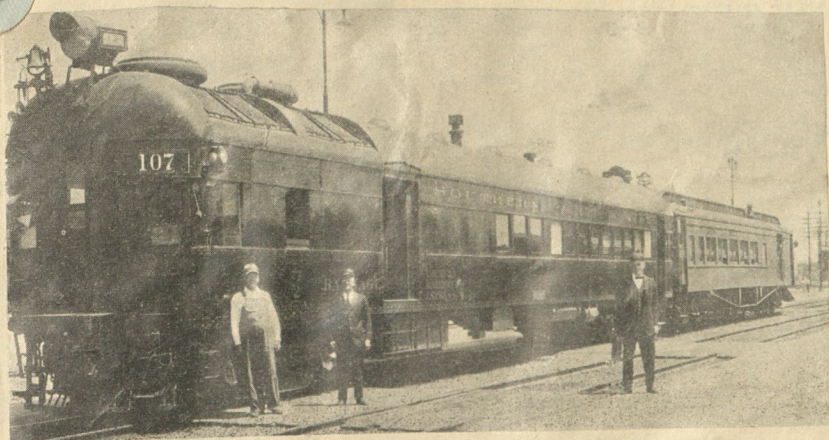


1903



1905

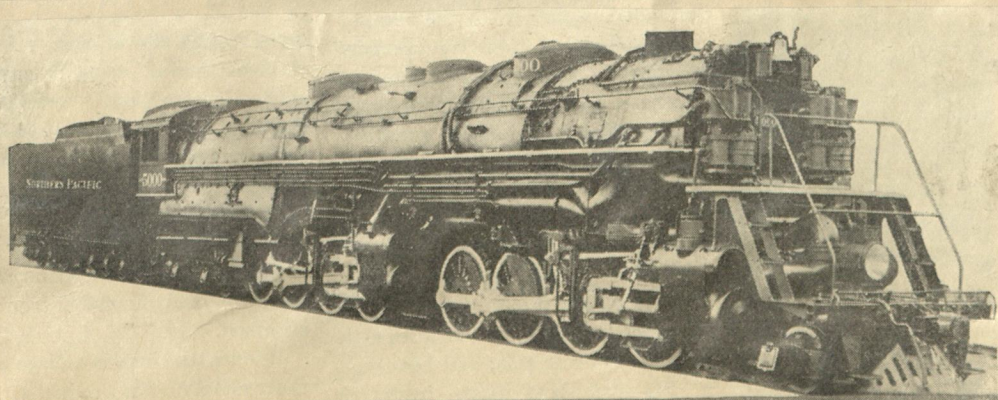
Important Steps in Locomotive Progress Since the Days When Stagecoaches on Rails Were Pulled by Rattling Wood Burners; Electric Power Necessitated Radical Changes in Engine Styles Which Have Passed through a Continual Evolution



The "Doodlebug" and its crew. Left to right: Ben Check, engineer; L. L. Lewis, brakeman; G. P. Martin conductor.



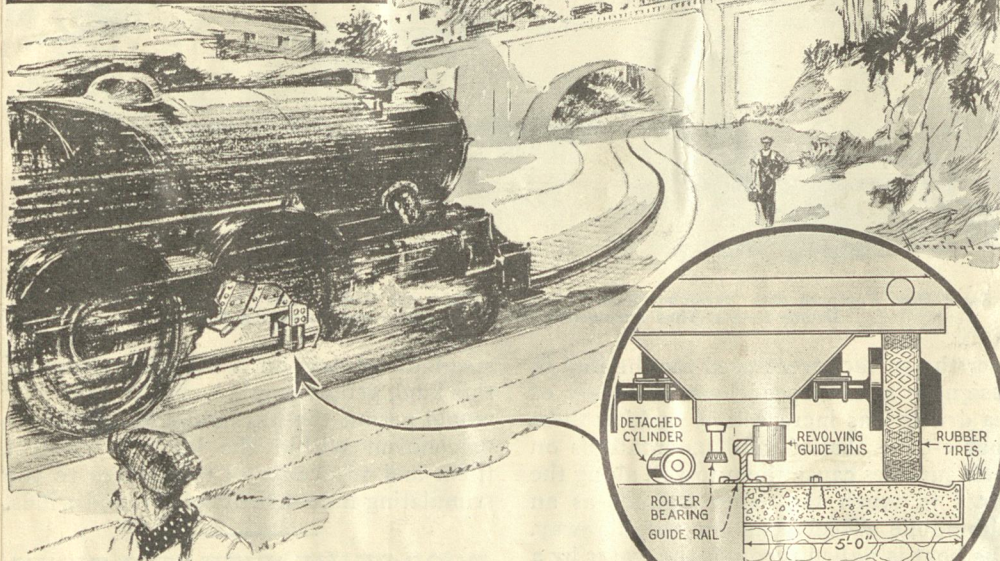
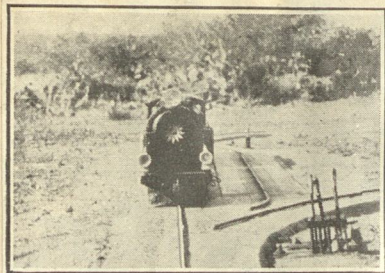
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Bigger and Bigger Grow the Giants of the Rails

This monster of the Northern Pacific Railway measures 125 feet, weighs 1,118,000 pounds.

Train Guided by Single Rail Runs on Rubber



Top, Left, Model of One-Rail Train; Center, Artist's Conception of Locomotive; Bottom, Right, How Train Is Guided

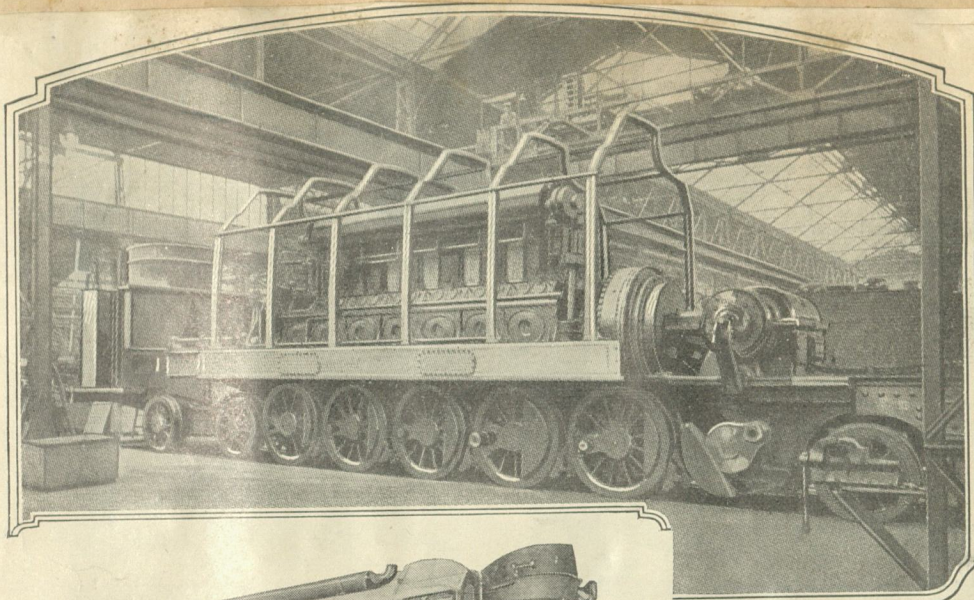
Eliminating double railroad tracks, cross-ties and flanged wheels on locomotive and cars, a new system of operating trains introduces a single guide rail, a concrete roadbed and rubber-tired wheels. The system is designed especially for small lines, where heavy traffic is not encountered, such as feeders to main lines, and as a means of transportation for farms, mines, quarries and sparsely populated areas that are in the process of development. The roadbed is paved with concrete or macadam. Fixed to the surface in the center is a continuous single rail, which guides the train by means of pins attached to each set of wheels. These pins prevent the train from leaving the track. Flangeless wheels, to which are attached wide rubber tires, are used. The single rail carries no weight and does not retard the

train's motion, since the guide pins revolve on roller bearings, eliminating friction. In forest areas, the guide rail could be made of wood. A considerable saving

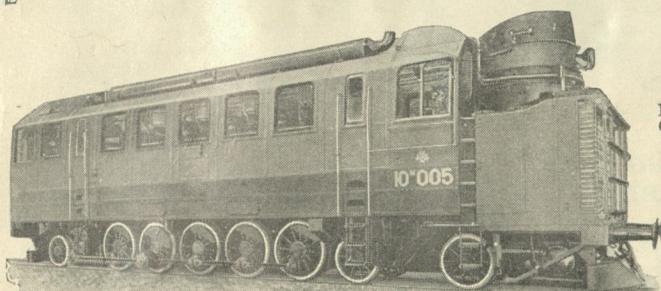
is claimed for this system, in addition to the advantages of quiet operation. A large-scale model of the system has been set up and operated by the inventor.



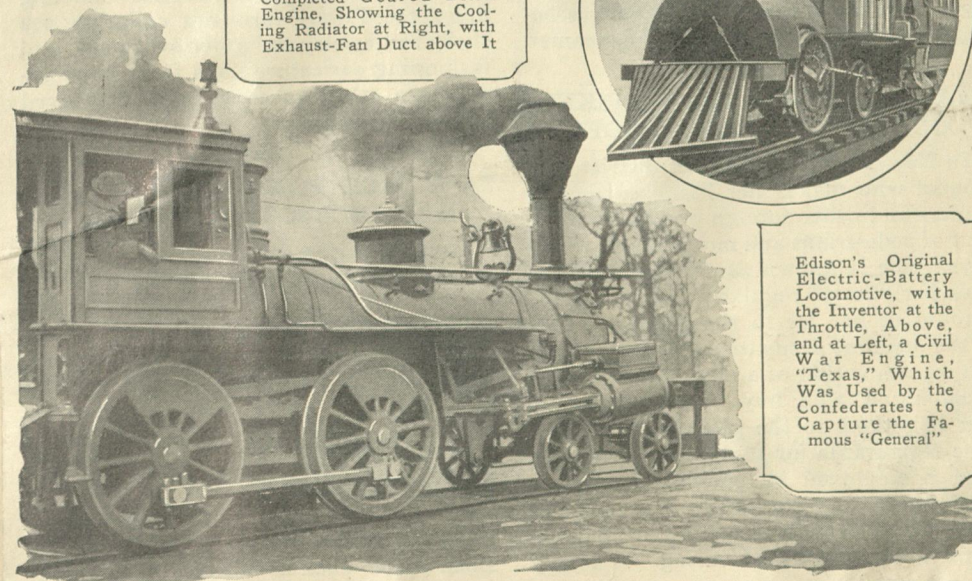
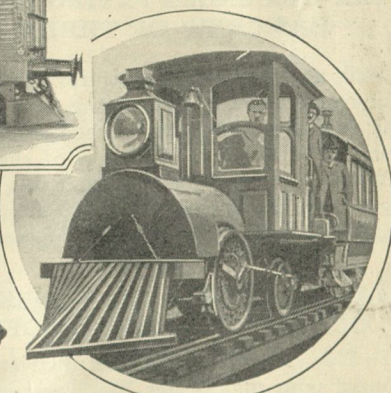
Extremes in Electric Locomotives; the Pygmy in the Foreground Is Run by Storage Batteries in Mining Work



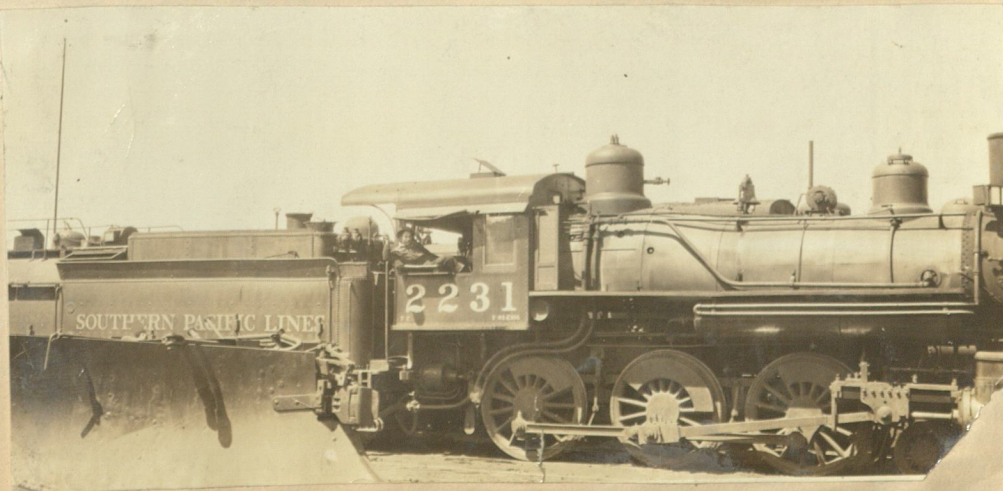
Running Gear and Framework of a Geared Diesel Locomotive, Built in Germany for Russian Railways



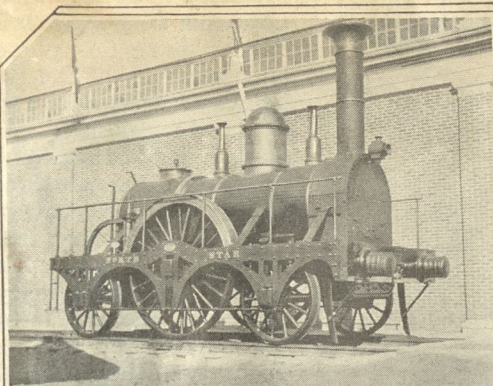
Completed Geared Diesel Engine, Showing the Cooling Radiator at Right, with Exhaust-Fan Duct above It



Edison's Original Electric-Battery Locomotive, with the Inventor at the Throttle, Above, and at Left, a Civil War Engine, "Texas," Which Was Used by the Confederates to Capture the Famous "General"



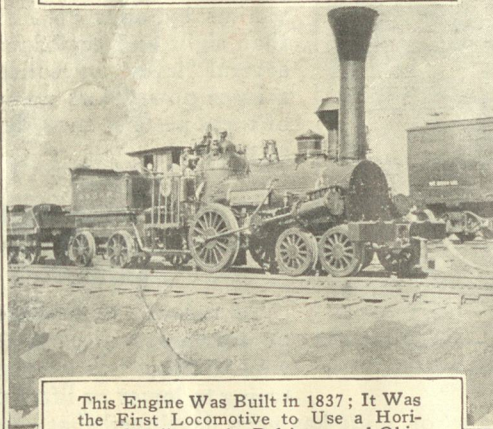
Early Wonders in Evolution of Locomotive



The "North Star," Built in 1837. One of First Engines on Great Western Railway of England; Its Drivewheels Were Eighty-Four Inches in Diameter



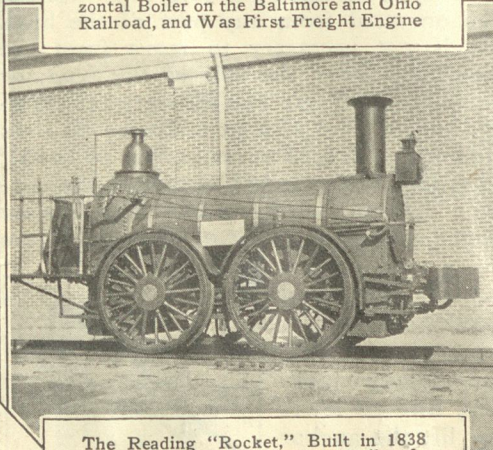
The "Atlantic," Built in 1832; This Century-Old Locomotive Had Vertical Boiler and Cylinders; It Ran under Its Own Power as Late as 1927



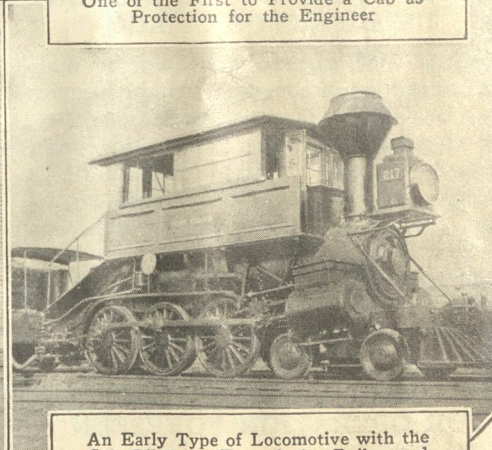
This Engine Was Built in 1837; It Was the First Locomotive to Use a Horizontal Boiler on the Baltimore and Ohio Railroad, and Was First Freight Engine



The "Thomas Jefferson," Another Early Type of Locomotive; It Was One of the First to Provide a Cab as Protection for the Engineer



The Reading "Rocket," Built in 1838 in England for the Reading Railroad; It Was Retired in 1879 after Having Run More Than 310,000 Miles



An Early Type of Locomotive with the Cab Piled on Top of the Boiler and Extending the Full Length of Its Straight Portion

